The New Zealand Whitegoods Industry - From Fordism to Single Batch Mass Production

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Abstract

The establishment of the New Zealand whitegoods industry was largely a product of the regime of accumulation which solidified out of a series of structural reforms set in place during the late 1930s and 1940s. Central to the regime, which flourished from the 1950s through to the early 1970s, was the expansion of a highly protected, import substituting, manufacturing sector supported by an internationally competitive and technologically dynamic agricultural sector. Throughout this period the whitegoods industry mimicked the fordist technological and competitive principles of North American and Western European whitegoods manufacturers. This pattern of development saw the level of technological sophistication and concentration within the industry increase steadily throughout the 1950s and 1960s.

The late 1970s and early 1980s saw the post-war regime of accumulation slide into an endemic state of crisis. This triggered a wide-ranging dismantling of the institutional matrix which had structured the post-war economy, in the hope that by allowing capital the freedom to do as it will New Zealand would move on to a new, sustainable, growth path. The success of these reforms remains to be seen. They have, however, greatly altered the competitive environment within which the whitegoods industry has been operating - increasing the volatility of the local market and exposing the industry to international competition. This has led to the withdrawal from the industry of all but two of the companies which survived into the 1980s.

Through the development of a range of technological and organisational innovations which transcend the limitations which fordist production systems place on companies which produce only on a small scale, one company (Fisher and Paykel) has managed not only to continue to dominate the local whitegoods market, but also to expand into international markets. Central to Fisher and Paykel's production systems - which can usefully be labelled single batch mass production - is the achievement of a high level of market flexibility. The flexibility afforded by these systems allow Fisher and Paykel to respond rapidly to changes within its existing markets and to opportunities which arise in new markets. The other company which has survived, Simpson (NZ) which produces only stoves and cooktops, has on a much smaller and over a much shorter time scale attempted to develop similar flexible production systems.

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CHAPTER ONE
Introduction

"...'If there's no meaning in it,' said the King, 'that saves a world of trouble, you know as we needn't try to find any. And yet I don't know...'"
(Lewis Carroll).

" ... in contemporary society commodity production for profit - i.e. capitalism - remains the basic organising principle of economic life, despite the various perplexing changes in the concrete forms this principle has assumed these past few years"
(David Harvey and Allen Scott)

This thesis tells the story of the New Zealand whitegoods industry. It is in some ways an unremarkable tale. Every household owns a refrigerator, a cooker, a washing machine and many also possess a dishwasher and a clothes dryer. These products are mundane - this is what makes them so fascinating. They are part of the everyday, taken for granted world of the modern New Zealander. They are, in a way, as much icons of twentieth century consumerism as the motor car.

Yet, it is easily forgotten that although the products of the whitegoods industry are commonplace their production is an intricate and complex process. The New Zealand whitegoods industry is a technologically dynamic one, which has been undergoing some major transformations and realignments. During the late 1980s the industry has, amongst other things, been opened up to international competition; one company was bankrupted, whilst another withdrew from the industry; in the two companies that have survived, the work-force has been reduced by several hundred and those workers that remain are being asked to adopt new work philosophies in response to the needs of new technology and in

recognition of the limitations of entrenched philosophies. The apparent mundaneness of the industry's products is remarkably at odds to the industry's innovation and dynamism in production.

Mundane products produced by an organisationally dynamic industry, such attributes provide some useful windows through which to view the transformations that have been occurring in the New Zealand economy and society. Thus the following text alternates between outlining the context within which the whitegoods industry has been operating and how this has shaped the industry, and using what is happening within the industry to help interpret developments in a wider context. The story the text narrates should not be seen as complete or seamless, however. To a certain extent the following chapters have been approached not with a view to define what has happened in the industry and what will follow as a result, but rather as a series of tentative questions and hypotheses that can be used to gain some insights, incomplete and partial though they may be, into the New Zealand and world economies. This is the study's raison d'être, and the study's success or otherwise should be judged on this basis.

The Sub-Plot - New Zealand in Crisis

To a significant extent the narrative of this study is concerned with exploring the concept of economic crisis. Economies do not develop in a simple linear fashion, generally they experience periods of relative stability, followed by periods of flux and uncertainty. Periods of stability are defined by the existence of a matrix of institutions and norms that facilitate a regular, predictable pattern of accumulation. Periods of stability are not without fluctuation and variation, rather they are periods where development takes place within a well defined band. Fluctuations or imbalances do arise from within the accumulation process, causing the economy's progress to shift from its average trajectory, however, such variations can be contained within the boundaries of the established institutions and norms. As such these imbalances do not threaten the existence of the dominant institutions and norms, they are what may best be labelled cyclical - or normal - crises (Boyer 1988a, pp 76. Lipietz 1987, pp 34.).

Cyclical crises can be contrasted to what may be called structural or system crises. Structural crises are situations that can not be contained within the logic of the existing matrix of institutions and norms (Boyer 1988a, pp 76). As a result periods of structural crisis are notable for the

uncertainty and flux which surrounds them. For social analysts such periods of flux and uncertainty present a massive challenge, as although the kernel from which new patterns spring is held within the old, the patterns that emerge from the periods of flux can not be directly extrapolated from the development trajectory experienced during the period of stability. Major social change - and economic change must be seen as such - is contested, hence its indeterminacy. Newly emerging patterns of activity vie with established patterns for dominance, and the degree to which the new and the old can accommodate each other depends on numerous variables such as whether the new patterns develop within existing structures, the existing institutions tolerance to change and so forth (Giddens 1981. Boyer 1988a. Castells 1980. Heilbroner 1985. Halal 1986).

The New Zealand economy is currently in the midst of a structural crisis. The institutions and norms that fostered almost three decades of increasing prosperity and relative stability from the late 1940s to the mid 1970s, are being challenged, undermined, and frequently replaced. The principal reasons behind this turmoil are simple to identify, the institutions and norms associated with the post-war prosperity and stability increasingly appeared to be unable to deliver further reliable increases to the national wealth, whilst at the same time many groups were beginning to successfully challenge the very legitimacy and sustainability of what had been achieved.

There is no simple explanation behind the exhaustion of the post-war structures of accumulation. Indeed the difficulty in understanding New Zealand's economic crisis is compounded by the reality that New Zealand society is not in the midst of a single well defined crisis, but rather is the midst of several crises. Amongst others these include a race crisis, a political crisis, and an environmental crisis. In many ways the economic crisis is the focus of the other crises that are embracing society, New Zealand is after all a capitalist society. Yet it cannot be said that the other non-economic crises are determined by developments within the economic sphere. To a certain extent the crises are mutually determined, each feeds into the others, nourishing and moulding their development, but at the same time each has a logic and a dynamic that are uniquely their own (Castells 1980, pp 43-47). For example whilst the political crisis is to a large degree a response to the failures of the economy to deliver further increases in prosperity, the failure of any group within the ruling elite to establish a new, politically stable, economically sustainable, power bloc has

placed severe constraints on the possibilities of finding a way out of the economic crisis (Jesson 1989. Oliver 1989).

Theorising the Crisis

All this raises the question of how to extend the above ideas on stability and crisis so that it is possible to slide from the specifics of particular site within a social system - say for example a company within the whitegoods industry - up to the macro-economic level. Put another way, it is necessary to develop concepts that link the specific sites of action with their mediating structures, whilst at the same time expressing how these sites are implicated in the continued reproduction, or otherwise, of a social-system. Rephrased this way it becomes clear that as well as being able to move from the generalities of the macro-structural level to the specific sites of social action, it is also necessary to move from the concrete forms existing at a specific site, through a range of increasingly abstract concepts, to understand the fundamental relationships at the heart of a system's continued reproduction through time and space (Harvey 1989a, pp 8-11. Boyer 1988a, pp 68).

A useful set of concepts with which to do this is provided by what is frequently referred to as régulation theory (Jessop 1990. Dunford 1990). The principle concern of régulation theory is to understand the logic behind periods of stable or balanced growth within capitalist societies or, to put this another way, it is concerned with understanding the processes that underpin periods of dynamic equilibrium. The corollary to régulation theory's concern with dynamic equilibrium is to understand why equilibrium dissolves or disintegrates (Aglietta 1987, pp 9-13. Boyer 1988a, pp 68).[1]

In the very long run, societies can be defined in terms of a set of fundamental relationships and tendencies, what may be called structural principles. Any social system will be notable for the existence of several structural principles. What marks out the uniqueness of a type of system however, and thus legitimates, indeed necessitates, the use of such blanket terms as capitalism, feudalism and so forth, is the existence of a structural

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1. Given these concerns the term régulation is somewhat misleading, suggesting as it does merely government attempts to control economic development, in fact the most accurate translation of régulation from its native French would be 'balancing mechanism' (Piore and Sabel 1984, pp 4).

principle that is exclusive to that system.[2] Within capitalist social systems the defining structural principle is the separation, yet at the same time intertwining, that exists between state and economic institutions (Giddens 1984, pp 180-185). The simultaneous exclusion within inclusion that exists between the economic and the political, is a direct expression of the predominance of the commodity and wage forms under capitalism (Giddens 1981, pp 110-128. Aglietta 1987, pp 17-18. Lipietz 1985, pp 18-20). Using this abstract reality as its starting point, Régulation theory develops increasingly concrete concepts to explain how the articulation and reproduction of this structural principle has changed through capitalism's history (Aglietta 1987. Boyer 1988a, pp 68. Lipietz 1987, pp 31-35).

Periods of stable reproduction are notable for the fact that the fundamental contradictions inherent within the wage and commodity relations are contained, albeit partially and imperfectly, without challenging the existing structural or institutional framework. During such periods a social system has what may usefully be labelled a coherent regime of accumulation. More precisely a regime of accumulation may be defined as a matrix of structures that meshes with a pattern of accumulation, such that any imbalances that may be generated in the natural course of the accumulation process are accommodated within the nexus of this matrix. Or put another way, any imbalances arising from the process of accumulation are endogenously régulated by the institutional matrix that makes up the accumulation regime (Boyer 1988a, pp 70-71. Lipietz 1986, pp 19). Obviously the structures that constitute a given regime of accumulation are complex. There must, however, exist a number of mutually complementary social, economic, and technological regularities for a regime to form. The most important of which are:

1. A system of productive organisation that defines how wage workers set the means of production in motion.

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2. Rather than using the concept of basic structural principles the régulation theorists - at least those upon whom this study is drawing - use that of mode of production. This study will avoid the use of the term, however, for although not without strengths the concept of a mode of production has several major defects that undermine its usefulness. The most important of these defects is that it implies that, throughout history the production process has been the primary, defining feature of social integration and social change. In fact this is not the case. Capitalism is unique because of the fact that the structures of domination that are the sources of both its cohesion and its primary contradictions exist within the production process itself. This is a sharp contrast to non-capitalist - socialist ones perhaps excluded - societies where power is exercised apart from the actual production process itself (Giddens 1981, pp 110-128).

2. A certain time horizon over which managers plan capital investment.

3. Income shares between the owners of labour, capital, and land that allows for the reproduction of the classes or groups associated with each.

4. Effective demand of a volume and composition that validates investment trends.

5. A specific relationship between capitalist and non-capitalist social systems.

(Boyer 1988a, pp 71).

The reproduction of these regularities, and thus of the regime, is mediated through a number of key institutional forms (Boyer 1988a, pp 71-72). Briefly these institutional forms can be summarised as:

a. Monetary and credit relationships.

b. The wage-labour nexus.

c. The nature of competition.

d. Links to the international regime.

c. The type of state intervention.

(Boyer 1988a, pp 73-75).

To understand how different regimes congeal into a coherent structure, it is necessary to understand how the mediating institutional forms have changed through time. Different combinations of these institutional forms offer different possibilities. A given combination of certain forms of monetary, wage-labour relationships, and so forth may or may not be compatible with a given pattern, or mode, of accumulation. Thus the functioning of a regime of accumulation, that is whether it is stable over a long period, hinges upon the formation of a set of institutional forms that are mutually complementary and interlock with the working of the mode of accumulation. Such a set of structures constitutes a mode of régulation (Boyer 1988a, pp 75. Lipietz 1986, pp 19).

The mode of régulation can be more rigourously defined as sets of individual and group behaviour which:

1. "... make possible conflicting decentralised decisions compatible without the necessity for individuals or even institutions to comprehend the logic of the whole system;

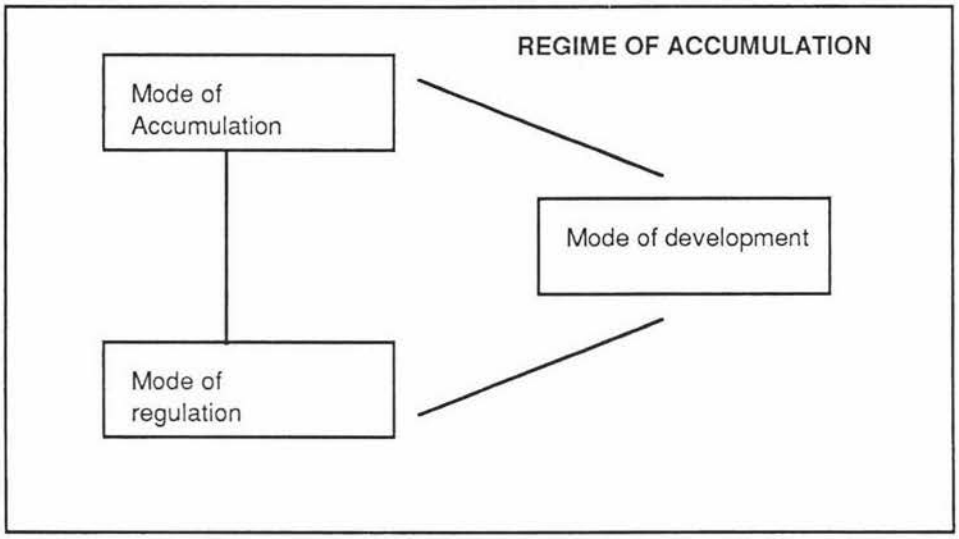
2. "... control and regulate the prevailing accumulation mode;

3. "... reproduce basic social relationships through a system of historically determined institutional forms."

(Boyer 1988a, pp 75).

Thus the form of an accumulation regime and the trajectory of its historio-geographic development - which in keeping with the concepts already introduced will be termed its mode of development - are the result of the specific form of the mode of accumulation, and how this mode is articulated through the regime's mode of régulation (see figure 1.1) (Aglietta 1987. Boyer 1988a, pp 79-86).

FIGURE 1.1: REGULATION THEORY - CENTRAL CONCEPTS



(Dunford 1990. Boyer 1988a).

The preceding discussion's emphasis upon the coherence of accumulation regimes and their constituent elements may seem unwarranted given the chaos and disorder that surrounds so much of capitalism's history. Yet it is not being argued that chaos and disorder are absent from stable regimes. In fact frequently the most striking feature of a coherent regime may be the apparently high level of conflict and disorder within it. What defines a coherent regime is the fact that the conflict and disorder do not directly threaten the reproduction of the social system. That is a number of mechanisms exist to minimise the significance of such disruptions. This is not to deny the significance of such disorder, nor should it be interpreted as suggesting that the abstract is in some

ontological sense more real than the concrete, rather it is a reminder that the abstract and the concrete form an interpretive totality, and that the disorder and order are not independent, mutually exclusive phenomena. Still this leaves open the question of why accumulation regimes collapse and how new alternative stable structures develop. To tackle these questions it is necessary to introduce the concept of crisis explicitly into the framework.

It has already been suggested that crises can be divided into two types, cyclical crises and structural crises. The original definitions for these are compatible with the régulationist's framework, therefore it is only necessary to reiterate the earlier discussion with direct reference to the concept of régulation.[3]

Quite simply cyclical crises are imbalances that develop within the normal course of the accumulation process. As such they are routinely contained within a regime's mode of régulation, and thus do not challenge the regime's reproductive schema. Indeed, as already been suggested, such crises should be seen as part of the general articulation of a regime of accumulation. It is important to note, however, that the institutional forms that are drawn upon in the course of régulating these crises will experience some 'drift' - to use Boyer's (1988a, pp 76) term - between cycles. Thus although the substantive structure of the mode of régulation remains throughout the duration of a regime, the specifics of the régulation process will vary from cycle to cycle (Lipietz 1987, pp 32-35. Boyer 1988a, pp 76).

Not all imbalances and contradictions are so benign however. In certain instances imbalances and contradictions will arise that can not be mediated through the existing system of régulation. In such situations the institutional forms that had previously linked together in a balanced, mutually reinforcing matrix interact in increasingly perverse ways perpetuating, and amplifying rather than containing the crisis. Thus from an apparently localised crisis the regime implodes into an ever tightening spiral of crisis. Such a situation may usefully be referred to as a structural crisis (Boyer 1988a, pp 76-77. Lipietz 1987, pp 34).

The origins of a structural crisis can be traced to either of two general conditions, the social and/or technological exhaustion of the accumulation potential of a regime, or the development of new patterns of accumulation that are contradictory to the current mode of régulation (Lipietz 1987, pp 34). It follows that to overcome such a crisis, it is

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3. In fact they were directly derived from it.

necessary to substantially modify the existing matrix of institutional forms, so as to open up fresh possibilities for accumulation. Given the disintegrating regime's matrix of institutional forms, its accumulation strategies, its technological system, and any nascent patterns that may exist within these, several possibilities for future modes of growth will exist. The specific mode that develops, however, hinges on the outcome of individual and institutional attempts to remould the crisis ridden institutional forms, and as such is indeterminate (Boyer 1988a, pp 76-77. Dosi and Orsenigo 1988, pp 31. Lipietz 1987, pp 15).

An Interpretive Window - What is an Industry?

Obviously in a small study such as this, it is not possible to view a given regime as a whole. Still, as the discussion has already suggested, by setting an industry within the context of a specific historic-geographic period is possible to gain some insights into the broader dynamics within a social system. Which raises the question, what is an industry?

The answer to this question may at first appear to be obvious. The automobile industry produces automobiles, the ball-bearing industry ball bearings and so forth. Certainly, but if a ball-bearing factory produces ball bearings exclusively for the use in automobiles, is it then classified as part of the automobile industry? If an automobile maker also makes ball bearings, is it part of the automobile industry, the ball-bearing industry, or both? If a company produces ball-bearings for axle assemblies for use in automobiles, how is such a company to be labelled? These questions highlight the fact that, except in a few very rare cases, the production of any given commodity will be dependent upon a complex web of forward and backward linkages, the nature of which will differ greatly both from company to company, and through time and space (Walker 1988. Holmes 1986. Scott 1988a. Storper and Walker 1989). This said, the study will not attempt to set out an explicit alternative definition of what an industry is. Instead, the study will define the whitegoods industry simply as the set of companies involved in the final assembly of refrigerators, freezers, washing machines, stoves and associated products. This definition provides a useful entry point from which to explore the nature of this set of companies' linkages within the wider industrial milieu, and how these linkages vary both from company to company and through time.[4]

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4. The nature of this definition precludes the extensive use of industry statistics collected by the New Zealand Statistics department for its Censuses of Manufacturing

Back to New Zealand

Using the above concepts the basic thrust of the following chapters can now be outlined. Very briefly, throughout the 1930s and 1940s a number of institutional - both national and international - innovations combined with a dynamic, but incompletely articulated, technological system to form a remarkably proficient and coherent regime of accumulation. For a number of reasons the logical coherence of this regime began to collapse from the late 1960s onwards. The magnitude of the regime's imbalance grew throughout the late 1970s and early 1980s as the prevailing system of régulation dissolved into a mass of contradictions. Despite these imbalances, however, the political consensus that underpined the regime held together. As a result a number of increasingly desperate attempts were made to modify the form of several key institutions to restore the regime's cohesion. Yet the imbalances remained. The post-war consensus finally flew apart in the mid 1980s, with the result that over the past seven years there has been a frantic rush to demolish and remould the post-war institutional matrix, and thus form a new mode of growth that transcends the limitations and contradictions of the post-war regime.

The success or otherwise of these initiatives remains to be seen. Developments within the whitegoods industry, however, offer some useful indicators as to how the new institutional forms mesh with individual company responses to the crisis. In fact, there have been a number of notable initiatives to develop labour processes and technological systems that are radically different from those dominant during the post-war period, suggesting that not only is the current period notable for the development of new forms of régulation, but also for a fundamental shift in

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and Business Trends publications. In part this is simply because up to 1976 the Statistics department placed vacuum cleaners, floor polishers, heaters and other small electrical appliances, in the same category as refrigerators, stoves and so forth. Whilst many of these small electrical appliances were placed in a separate category after this range-hoods remained in the same category, and although range-hoods were made by several whitegoods companies in the 1970s and 1980s, they were (and still are) also made by a number of companies who were also engaged in the production of a range of small household appliances. The other limitation of the industry statistics is that they are, for obvious reasons, presented only in aggregate form. As a result they hide the very important differences between individual companies which is one of primary focuses of this study. It should also be noted that the standard industrial category which includes whitegoods manufacturers, in recent years at least, has included a number of companies which were wrongly allocated. For example it included two manufacturers of commercial dishwashers and glass cleaners (Personal documents. Personal correspondence. Personal interviews).

the nature of the accumulation process. Before these transformations can be examined, however, it is first necessary to trace the industry's development during the post-war period, as well as more fully outline the fundamental features of the post-war regime. This is where the second chapter will take up the story.

CHAPTER TWO

The Formation of the New Zealand Whitegoods Industry and the Post-War Regime of Accumulation

"... the ideals of New Zealanders: to live in a country with fresh air, an open landscape and plenty of sunshine; and to own a house, car, refrigerator, washing machine, bach, launch, fibre-glass fishing rod, golf-clubs, and so on. These aims are relentlessly pursued, and widely achieved..."
(C. K. Stead).

Throughout the 1950s, 1960s, and up until the mid-1970s New Zealand experienced, except for a few aberrant years, a period of general economic stability and prosperity. Economic activity grew at a per capita average of two percent per annum, unemployment was minimal, the inflation rate was low and stable, and the balance of payments was broadly in balance (Gould 1982). This sort of stability was unprecedented in New Zealand's history, the 1920s and 1930s for example had seen erratic growth, endemic unemployment, and regular balance of payments crises (Brooking 1981. Hawke 1985, pp 122-143). In fact, the contrast between the stability of the post-war period and the vicissitudes of earlier years, reflect a fundamental transformation of a number of central socio-economic institutions during the 1930s and 1940s (Brooking 1981. Hawke 1985, pp 11-102. 144-179). The nature of these transformations, and their overall coherence are complex and only partially understood, and it is not possible within the limited scope of this study to examine them in any great depth. It is possible, however, to sketch out the key dimensions of the post-war mode of development.[1]

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1. Obviously any such sketch will be contentious, generalities must of necessity partially obscure the richness and complexity of everyday life, suggesting a misleading level of rationality and completeness (Boyer 1988a, pp 68). Still there is

The Post-War Mode of Development

At the heart of the post-war mode of development was a crudely conceived synergy between an innovative, highly productive, internationally orientated export sector, and a protected, inwardly oriented, import substituting manufacturing sector. The export sector generated foreign exchange, whilst the import substituting sector used much of this foreign exchange importing materials for processing into goods for local consumption, in the process providing employment at high wage levels for those who could not be absorbed by the export sector. The link between these two sectors was constructed and supported by the state. This relationship was a simple solution to two maladies that had blighted the New Zealand economy throughout the 1920s and 1930s; rising unemployment, and a chronic vulnerability to fluctuations in the world economy. Both of these maladies were intimately tied up with a number of developments during the period from the 1880s through to the 1910s which saw the Dominion's prosperity come to depend almost exclusively upon the production and export of a narrow range of pastoral products. Given the importance of this period, the discussion will fold back to the 1880s before engaging with the post-war years.

The Advent of Refrigeration and the Expansion of Intensive Pastoralism

Prior to the 1890s New Zealand's social and economic development was remarkable for its precarious and ephemeral nature.[2] There were pockets of stability amidst this flux, extensive pastoralism flourished, and significant numbers of small farmers managed to derive a reasonable living from their holdings. Although the 1870s saw a self conscious effort to reshape this pattern of development, the colony was hamstrung by its geographic isolation. The introduction of refrigerated shipping in the 1880s eroded this isolation, and in so doing provided the catalyst for a major transformation in New Zealand's economic structure. Refrigerated shipping, by making possible the export of meat and dairy products across the equator, sparked a movement towards intensive forms of pastoralism. This movement was given further impetus by the ideology, pervasive within the colony, of the moral desirability of the small scale family farm

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potentially much to gain from such a general statement, and so with an eye to the perils of such an exercise, the discussion will proceed.

2. Please read for New Zealand, European settler society.

(Gardner 1981, pp 80-82. Fairburn 1975, pp Brooking 1981, pp 226. 229-235. Hawke 198, pp 88-97. Condliffe 1930, pp 217).

The expansion of pastoralism reverberated through the rest of the economy, underpinning significant growth in both the manufacturing and service sectors (Blyth 1974, pp 4-9. Condliffe 1930, pp 225-229. Hawke 1985, pp 42-56. Armstrong 1978, pp 300-301). Furthermore, the growth of these sectors led to a significant increase in the level of urbanisation. Indeed although New Zealand's mode of development centred upon the supplying of partly processed agricultural products to the United Kingdom, the urban centres came to play an increasingly decisive role in New Zealand's social and economic development during this period (Olssen 1981, pp 253-256. Pearson and Thorns 1983, pp 39-47).[3]

The Passing of Prosperity - the 1920s and 1930s

The general growth and prosperity of the previous couple of decades did not last into the 1920s, instead the New Zealand economy slid into a period of uncertainty. Economic growth was not entirely absent, but the fortunes of the economy fluctuated widely. Pastoral exports showed little growth, reflecting the saturation of the United Kingdom market, whilst the prices received fluctuated enormously.[4] These difficulties checked further expansion of those manufacturers involved in the processing of these exports, whilst import substitution based manufacturing also made little progress (Hawke 1985, pp 99-102). The end of the decade brought no relief, indeed the stagnation of the 1920s was overtaken by full scale depression as a collapse in the international economy was transmitted into the New Zealand economy. Unemployment, which for significant groups of people had remained prevalent throughout the earlier decades, became widespread, and large of numbers of people who had enjoyed the prosperity of earlier years, most notably small-scale, sheep, meat and dairy

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3. Which is not to say they had not been of great importance in the past. Nor does it imply that the farming sector became economically or politically impotent during this period, clearly they did not. In fact, although the period between 1891 and 1911 saw an increase in the level of urbanisation, the number of farmers as a percentage of the working population increased from 2.7 to 12.1 (Pearson and Thorns 1983, pp 46). Still as broad generalisation the argument that urban centres became of increasing importance is valid.

4. In fact over the decade as a whole they actually declined. However, this is somewhat misleading as 1920 marked the beginning of a large but short lived fall in international prices, whilst the end of the decade saw a similar price collapse that was much more long lived. See Hawke (1985, pp 91) to get some extent of the large variations that were experienced during this decade

farmers, saw their incomes fall sharply (Hawke 1985, pp 122-143. Brooking 1981, pp 247-248. Olssen 1981, pp 266-67).

The uncertainties and failures of the 1920s and first half of the 1930s brought into sharp focus both the precarious nature of New Zealand's social and economic development, and the unevenness with which the burdens of this insecurity were distributed. As a result the Depression acted as a catalyst for a fundamental shift in the dynamics of New Zealand's social and economic development (Richardson 1981, pp 221-222. Chapman 1981, pp 333-337). Making sense of this transformation is complicated, not least because those individuals who initiated it lacked a coherent vision of what they were creating. Still what is clear is that the initiatives that shaped this transformation were linked by an overarching desire to transcend the social and economic insecurity that had been so prevalent during the preceding decades.

The Foundations of the Post-War Mode of Development

As the introduction to this section suggested, the post-war mode of development was founded upon two closely interrelated initiatives, the welfare state and an industrial policy which sponsored import substituting manufacturing. These initiatives reflected the desire both for greater economic security and to transcend the pastoral sector's economic dominance. Yet what was most remarkable about both these initiatives, was not, as is frequently stressed, their radical nature, but rather the manner in which they maintained, despite efforts to the contrary, the primacy of the pastoral sector. Certainly they did modify in some key respects the links between the pastoral sector and the rest of the economy, but the pastoral sector remained the sector that ultimately defined the prosperity or otherwise of the New Zealand economy (Franklin 1978, pp 48. 1985, pp 16-17. Hawke 1981, pp 369-370. Rose 1969, pp 62-75. Blyth 1973, pp 7-10). Although this may seem paradoxical, it is not. Rather New Zealand's continued dependence upon pastoral exports was, as the following discussion will explain, a politically convenient historical sleight of hand.

The development of the welfare state was the most visible product of the Depression. Prior to the 1930s the role of the state had self consciously been limited in size and scope, the belief that economic activity was the prerogative of private enterprise was an unquestionable shibboleth of those in power. Still there was some elasticity in the interpretation of what constituted sensible state activity, on several occasions the state did

undertake strategic interventions at the behest of straitened entrepreneurs, and faith in the intrinsic superiority of free enterprise had not disallowed the belief that the state may have to protect the most vulnerable from the more rapacious demands of the free market (Sinclair 1980. Dalziel 1981. Richardson 1981). The insecurities of the 1920s and early 1930s, however, corroded many people's faith in free enterprise, and the successes of the Labour Government, elected in 1935 upon the strength of this sentiment, confirmed the validity of this scepticism. Labour established a universal social welfare system, designed to ensure that every New Zealander had access to an adequate level of income, housing, health care, and education, which had the effect of enfranchising a large bloc of the working class which previously had been largely neglected. The Labour Government also maintained that it was the state's responsibility to ensure an adequate level of aggregate demand, and thus employment, and with these goals in mind developed tighter control over the monetary system, and undertook a number of initiatives, many of which were closely tied to its welfare policies, to reflate the economy (Chapman 1981, pp 333-347. Sinclair 1980, pp 269-271. Rosenberg 1960, pp 31-36. Olssen 1981, pp 277. Jesson 1989, pp 11).

The welfare state was premised upon an expanding economy. In the absence of an underlying trend towards economic expansion welfare schemes and macro-economic stabilisation policies can do little more than ensure that the burdens of stagnation are equally shared. Such a trend was largely absent from the New Zealand economy in the 1930s, however. Although pastoral exports went through something of a revival in the latter half of the 1930s, the nature of this expansion was such that, unlike in the 1900s and 1910s, the pastoral sector was incapable of pulling the economy upwards with any great force. This requires some explanation.

The expansion of the pastoral sector during earlier decades was largely extensive. It had involved the establishment of new farms, factories and ancillary services (Hawke 1985, pp 88-97. Blyth 1974, pp 5-7) By the 1930s, however, most of the growth in pastoral output, (and it should be remembered that despite falling prices the volume of output did in fact increase during the depression), was being generated through increases in farm productivity, rather than from an extension of the area being farmed. Moreover, a similar pattern was apparent in the processing industries. Had New Zealand's labour force been stagnant this pattern of development would not have been a problem. Unfortunately, given New Zealand's

expanding labour force, it was (Hawke 1981, pp 378-379. Le Heron 1989a, pp 21. Blyth 1973, pp 8-9. 1974, pp 7).[5]

Clearly any solution to the problem of generating and sustaining a long term increase in employment would require a significant movement, in one form or another, of resources away from the pastoral sector. Given the continued political importance of pastoral interests, such a movement was politically contentious, hence the solution arrived at by the Labour Government rather than being pro-active was passive involving the use of import licenses and tariffs to foster import substitution based manufacturing. Indeed the Labour Government's industrialisation programme was based as much upon accident as it was upon a coherent vision of what such a programme should achieve. Import licensing, the central policy lever of the industrialisation programme, was originally introduced in response to the 1938 foreign exchange crisis to ration imports and hence maintain internal demand and employment in the face of falling export receipts. The fact that it stimulated manufacturing was merely a fortuitous by-product of this rationing, and it was not until after the Second World War that the import licensing scheme came to be seen primarily as a lever with which to stimulate industrialisation (Hawke 1985, pp 163-166. 260. Wooding 1987, pp 87. Rosenberg 1960, pp 32-36. Blyth 1973, pp. 8-9).

Although both the welfare state and the import substituting industrialisation programme were introduced by a working-class dominated government, the overall structure of both of these reforms was maintained by subsequent National Governments. During its period in power Labour had created an amalgam of interests whose immediate prosperity, if for very different reasons, was closely tied to the survival of Labour's initiatives. Both workers and manufacturers, were committed to the industrialisation programme, just as both supported the use of macro-economic stabilisers. Furthermore, many middle-class families, as well as working class families had profited from the welfare state. Certainly there were groups - class factions if you prefer - who opposed both the welfare state and the use of trade barriers to foster manufacturing, amongst whom

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5. Or perhaps more importantly was felt to be a problem by those in power. It can be argued, allowing for a certain amount of unemployment whilst the economy adjusts to the surplus of labour, that New Zealand would have developed an internationally competitive manufacturing sector in response to this situation, certainly the increase in secondary manufacturing during the 1930s lends some weight to this argument (see for example Blyth 1974). The key point to remember, however, is that the Labour Government, given its commitment to full employment, saw it as a problem.

farmers were most obvious. Still when in 1949 the conservatives (National) managed to oust Labour from office they recognised that many of their supporters agreed with the principles, if not necessarily the detail, of Labour's reforms, and hence their efforts focussed upon modifying the balance of these reforms rather than completely overhauling them; a pattern that, reflecting the basic success of the system the reforms initiated, was followed by subsequent governments throughout the 1950s and 1960s (Chapman 1981, pp 356. Jesson 1987, pp 32-47. Gould 1982, pp 48-88. Blyth 1973, pp 7. Franklin and McQueen 1973, pp 17).

The Dynamics of the Post-War Mode of Development

The expansion of import based manufacturing provided the central growth dynamic within the post-war economy. The dynamics behind the expansion were, in essence at least, relatively simple, and can usefully be set out via a flow diagram (see figure 2.1). Although the diagram is mostly self explanatory the following discussion will briefly flesh out the key dimensions of the diagram.

The existence of import licenses and tariffs provided a highly protected market for New Zealand manufacturers. The protected market complemented the state's commitment to maintaining a stable investment environment. Hence import dependent industries manufacturing consumer goods for the internal market offered, in aggregate, highly attractive investment opportunities. Initially most of the expansion of manufacturing was concentrated in fairly rudimentary industries.[6] Through time however, these industries became increasingly complex. Internally the sophistication and scale of the processes being used increased, whilst externally the links between these firms and other industries grew more intricate. Moreover, as these industries expanded, and their sophistication grew, they supported and to an extent engendered the development of a complex nesting of labour markets, ranging from the unskilled, involving large numbers of Maori rural migrants and Pacific Island migrants, up to highly skilled managerial and design workers, many of whom were European immigrants. The importance of these links were such that much of the growth of import substituting manufacturing was concentrated in the main centres. Indeed, this concentration should be

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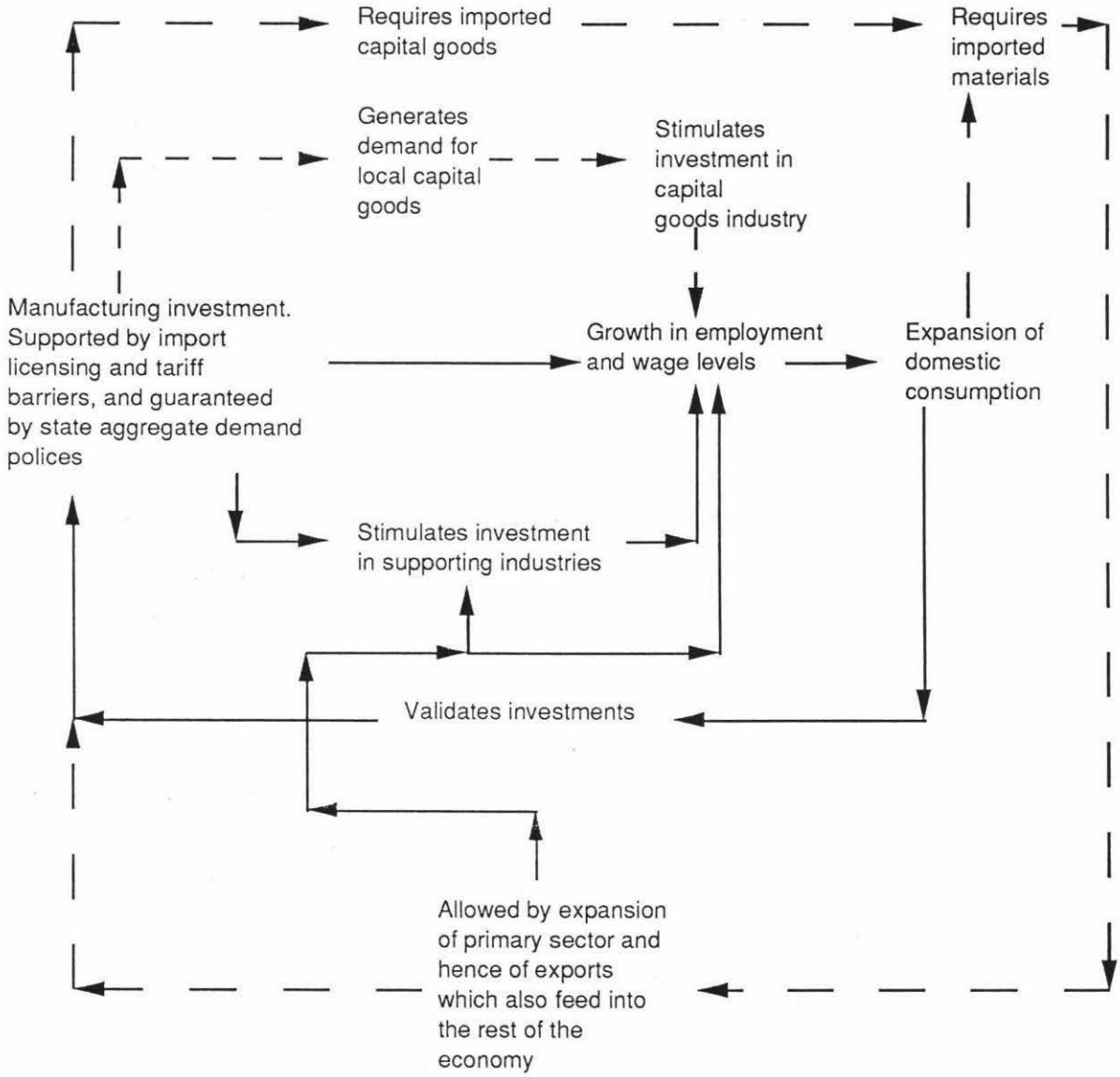
6. Rudimentary in the sense that the processes they were under taking were simple. Frequently local manufacturers did little more than put the finishing touches to relatively complex goods (see pages 38-42).

Figure 2.1. The Post-War Cycle of Growth



(Source: Boyer 1988a, pp 7. Franklin 1978. Hawke 1985. Gould 1982).

seen as a continuation, or perhaps more accurately an intensification, of the earlier trend which saw those industries that were not tied to the agricultural sector locating in the main centres (Franklin 1978, pp 11-26. 199-220. Hawke 1985, pp 250-263. Linge 1957. Sewell 1967. Rose 1971. Johnston 1973. Armstrong 1973, pp 93-100).[7]

The expansion of manufacturing was paralleled by an expansion of service and administrative activities. As in the period before the depression the expansion of these activities was largely derivative. Still it should be noted that industries such as the construction industry not only provided the infrastructure necessary for the smooth functioning of the accumulation process, but also generated significant demand for an array of commodities, and in so doing generated a growth dynamic similar to that engendered by the manufacturing sector (Franklin 1978, pp 54-56. Hawke 1985, pp 264-272. 278-290).

The link between investment in both the manufacturing and service industries and the validation of this investment was provided by the increased employment and income levels this expansion engendered. This expansion in consumer income was centred, by and large, upon the achievement of a suburban 'familial arcadia' (to borrow a term from Fairburn 1975); the material embodiment of the petty bourgeois ideals of individual effort, material gratification, and the nuclear family (Franklin 1985, pp 36-38. Chapman 1981, pp 405. Cook 1985). These ideals were certainly not unique to the post-war period, nor to New Zealand, but increasing prosperity, in tandem with support from the welfare state, made the suburban lifestyle an achievable reality for a large number of working-class families during the 1950s and 1960s (Fairburn 1975, pp 14-16. Olssen 1981, pp 258-260. 273-277. Olssen and Levesque 1978, pp 6-14. Chapman 1981, pp 356. Dunstall 1981, pp 404-405. Easton 1967, pp 12-15). The

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7. This account of the post-war expansion of manufacturing is somewhat conjectural, and rather than being seen as a definitive statement should be seen as first cut and highly simplified account of the dynamics behind this expansion. Little has been written in the New Zealand context about the temporal and spatial dynamics of the expansion of manufacturing and it seems reasonable, in the absence of evidence to the contrary, to suggest that the dynamics of the expansion of manufacturing in New Zealand during the post-war period were broadly similar to those of other advanced capitalist countries such as the United States and the United Kingdom. Certainly it must be remembered that the sophistication and scale of development was less, and the novelty of such industrial expansion was greater. Still despite these reservations the work of theorists such as Dunford and Perrons (1986), Harvey (1989a. 1989b), Massey (1984), Soja. (1989), Storper and Walker (1988) and Scott (1988a. 1988b) offer an extremely useful starting point from which to interpret the dynamics of New Zealand's post-war industrialisation.

post-war suburban expansion was further accentuated by a large influx of immigrants (see page 18) in the household forming age groups, combined with a marked transition in the marriage and fertility patterns during the period which saw a significant reduction in the average age of marriage, an increase in the marriage rate and hence a upsurge in the rate of new household formation (Gilson 1970, pp 47-48. 52. Dunstall 1981, pp 400-401. Franklin 1978, pp 16-18).[8]

The post-war period also saw a continuation of the pastoral sector's recovery from the troubles of earlier decades. Conditions in traditional markets were generally favourable, and successful efforts were undertaken to establish new markets. In response to these conditions, and aided by a range of technological developments from aerial-top dressing to artificial insemination, production increased steadily throughout the 1950s and 1960s (Franklin 1978, pp 137-140. Hawke 1985, pp 231-249. Le Heron 1989a. 1989b). This expansion underpined the more dynamic growth of the manufacturing and urban service industries, for although manufacturing was the focus of the post-war economic expansion, its viability was tied to the success or otherwise of the pastoral sector (see figure 2.1). The link was a simple one. As many of the manufacturing industries relied heavily upon imported machinery, raw materials and components, their continued expansion was predicated upon an increase in the availability of foreign exchange. However most of these industries, reflecting the bias of the industrialisation policy, were highly introverted and generated little or no foreign exchange. Hence pastoral exports had to be relied upon to supply the necessary increase in foreign exchange. Thus the import substitution programme rather than making New Zealand less dependent upon the fortunes of the pastoral sector merely made the link between pastoral sector and the rest of the economy more opaque (Franklin 1978, pp 48. 1985, pp 16-17. Rose 1969, pp 74. Blyth 1973, pp 8-9).

The formation and development of the whitegoods industry was intimately intertwined with the post-war mode of development. It was one of the many industries whose development was fostered by the use of import licenses and tariffs, clustering as many of these industries did in

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8. It should be noted here that although the current historiographic consensus stresses that the net effect of post-war immigration policies was a lowering of the per capita increase in income levels, immigration did raise the aggregate level of income in New Zealand, and this, rather than the per capita impact, is of most significance in terms of providing opportunities for investment (Gould 1982, pp 226. Hawke 1985, pp 185-187).

the main urban centres (see maps 2.1-2.3). What-is-more the increasing ownership of whitegoods was closely tied up with the mass consumption norms that became increasingly pervasive during the post-war period. Not only were washing machines, refrigerators and such like important consumption items in their own right, but they also provided the catalyst for revolutions in a number of other sectors. The spread of refrigerator ownership helped precipitate the development of automobile orientated supermarkets. Freezers allowed the introduction of a plethora of new food products from frozen vegetables to T.V. dinners. And washing machines created a market for a diverse range of powders, liquid detergents, and fabric softeners. These new products also created a revolution in the household economy eliminating many of the more arduous household chores, yet at the same time facilitating the spread of a 'cult of domesticity' in which women's worth came to be defined solely in terms of their ability as care givers and emotional buffers against the capricious and heartless outside world (Du Vall 1988. Goodman et al. 1987. Olssen and Levesque 1978. Cook 1985. Cowan 1976. Strasser 1982. Miller 1991. Wolf 1990).[9]

The Formation of the Whitegoods Industry

Prior to the Second World War few whitegoods were manufactured in New Zealand, certainly it was not possible to identify a distinctive whitegoods industry. Given the novelty and high cost of products such as electric ranges, refrigerators, and washing machines, and the limited size of the New Zealand market, the absence of an indigenous industry was unremarkable.[10] Still, some whitegoods manufacturing was undertaken.

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9. Take for example Cowan's (1976) discussion of the transformation of the attitudes of middle class American housewives to house work during the 1920s:

> After the war house work changed: it was no longer a trial and a chore, but something quite different - an emotional 'trip'. Laundering was not just laundering, but an expression of love; the house wife who truly loved her family would protect them from the embarrassment of tattletale grey. Feeding the family was not just feeding the family, but a way to express the housewife's artistic inclinations and a way to encourage feelings of family loyalty and love. Diapering the baby was not just diapering, but a time to build the baby's sense of security and love for the mother. Cleaning the bathroom sink was not just cleaning, but an exercise of protective maternal instincts, providing an a way for the house wife to keep her family safe from disease (Cowan 1976, pp 16).

It should be stressed that in New Zealand the cult of domesticity originated around the turn of the century (or earlier). During the 1950s, however, that the cult reached its high point (Olssen and Levesque 1978).

10. It is important to note that the whitegoods industry internationally did not become of any significance until the 1920s. The production of refrigerators in America provides a useful case in point. Although refrigerators were produced in significant

H. E. Shacklock, a Dunedin based company, introduced an electric range in 1926 as a supplement to its series of coal ranges and was followed in the early 1930s by two other manufacturers. Additionally a number of companies involved in the importation of refrigerators did engage in limited manufacturing and assembly processes. Fisher and Paykel an importer of home appliances, for example, was making cabinets for some of its models of refrigerators before the introduction of import controls (Sewell. 1965. pp. 26-27. Department of Industries and Commerce 1956, pp 5. Tait 1959, pp A-70).

The post-war years saw the rapid expansion of whitegoods manufacturing such that it became possible to talk intelligently about a New Zealand whitegoods industry. Most of this expansion can be attributed to the introduction of the import licensing system in October 1938. The protection afforded by import licensing during the 1940s was close to total (see table 2.1) (NZ Department of Industries and Commerce 1956, appendix B). Obviously concentration upon the war effort during the first half of the decade precluded any large scale movement towards the production of whitegoods, although a number of firms had begun producing refrigerators and washing machines prior to the movement to a war economy. The latter half of the decade, however, saw the manufacture of whitegoods reach significant volumes, although it should be noted that production was hindered for several years after the ending of hostilities by the difficulty of obtaining imported components, as well as by labour shortages (Sewell 1965, pp 32).

Table 2.1. Imports of Ranges, Refrigerators and Washing Machines 1938 and 1949 (value pounds)

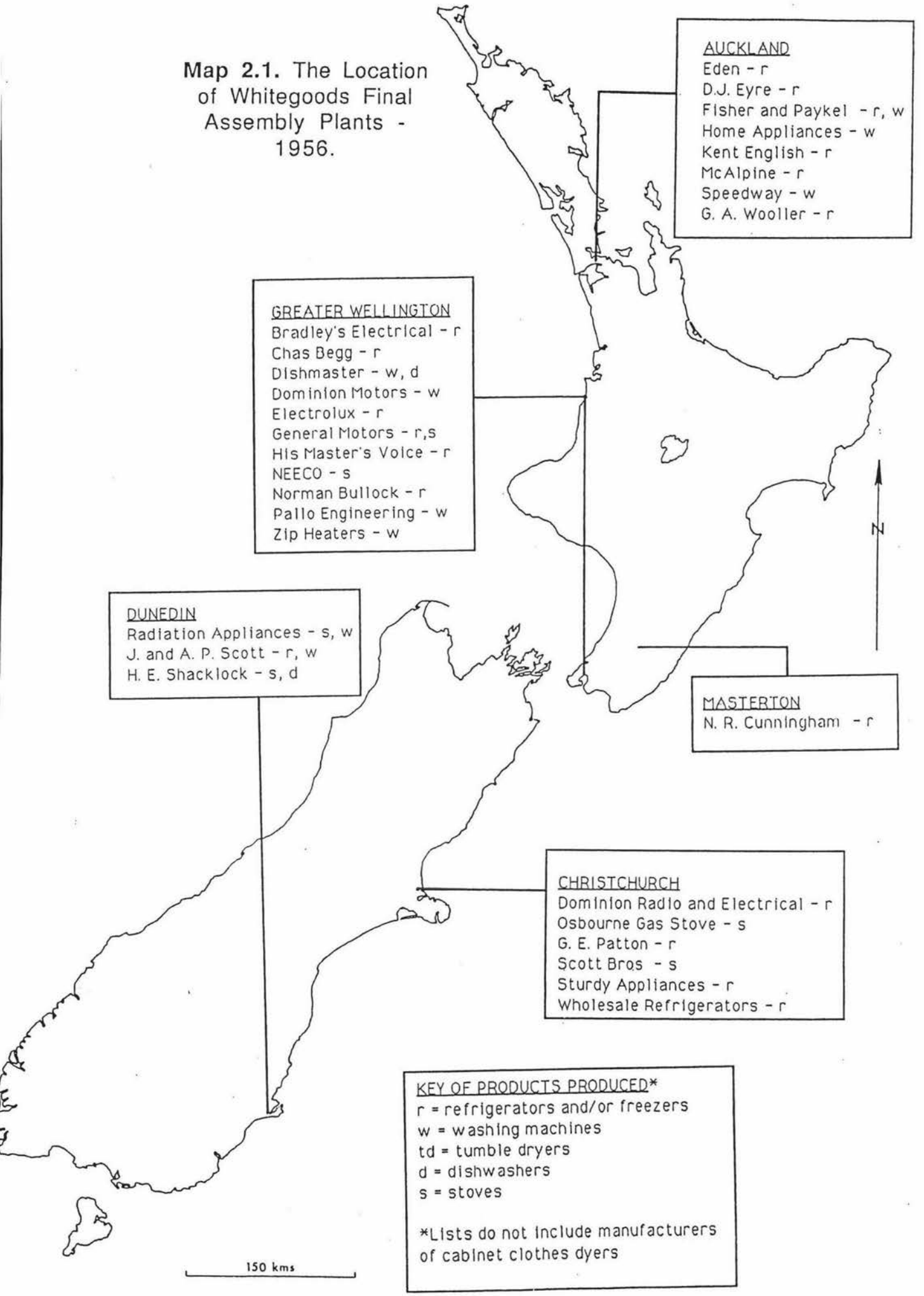
	Ranges	Refrigerators	Washing Machines
1938	123 489	170 386	105 476
1949	1 291	5 566	7 105

(Source: NZ Department of Industries and Commerce 1956, Appendix C).

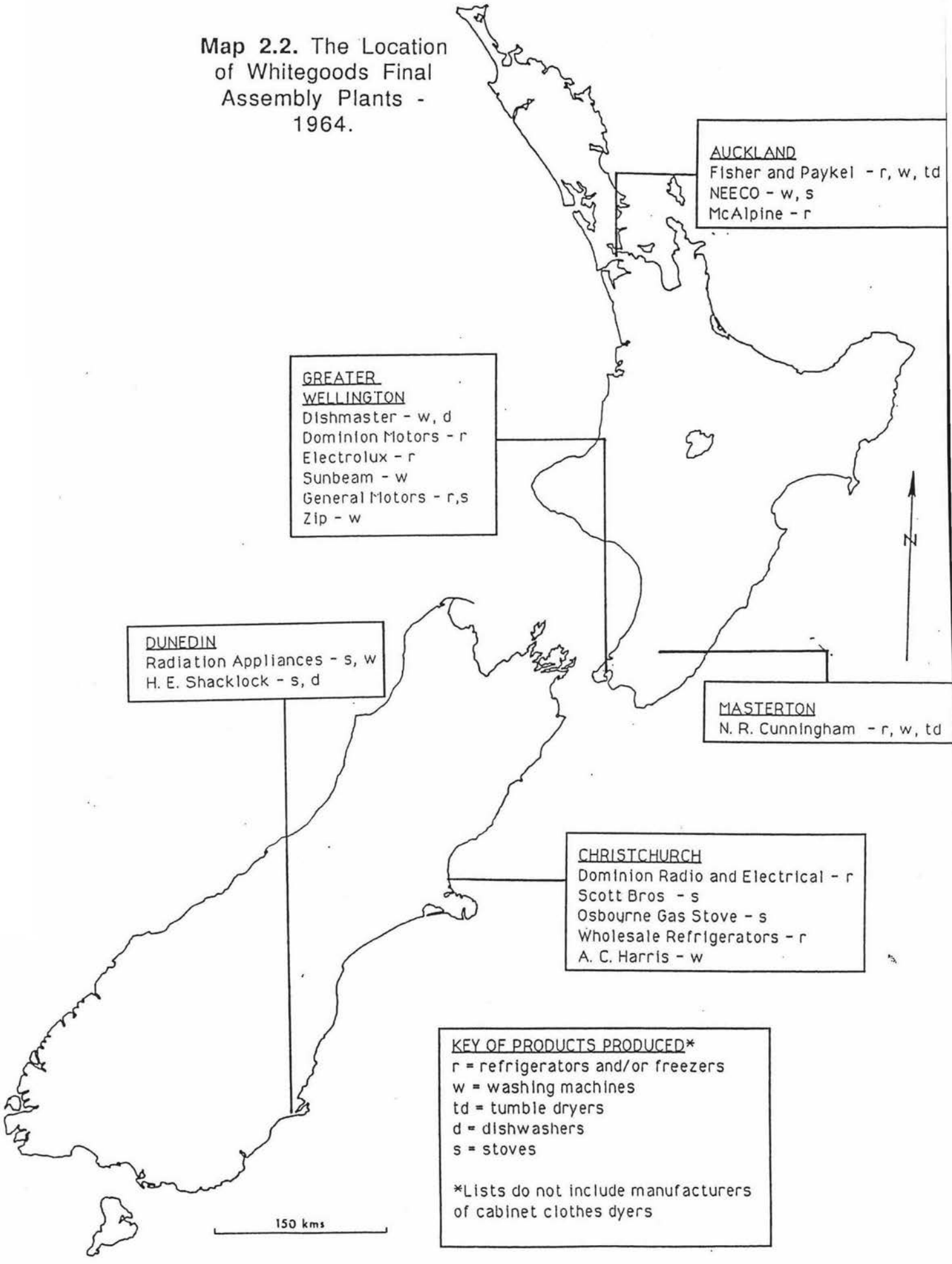
The initial post-war expansion of whitegoods production was largely a response to the backlog in demand that had been created by the war. But

volumes during the 1920s, in 1919 only 5,000 electric refrigerators were produced (Corley 1966, pp 107. See also Du Vall 1988).

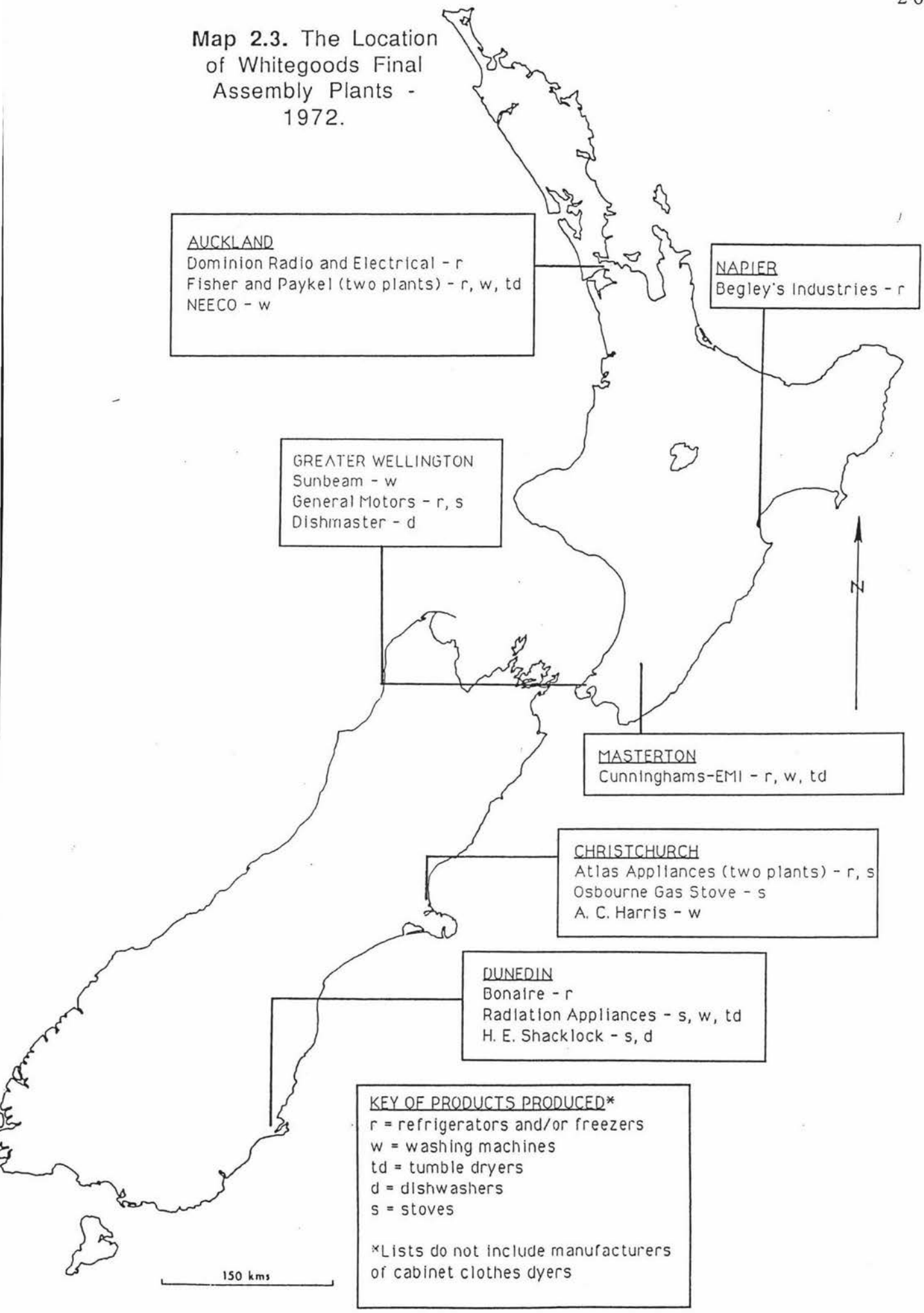
Map 2.1. The Location of Whitegoods Final Assembly Plants - 1956.



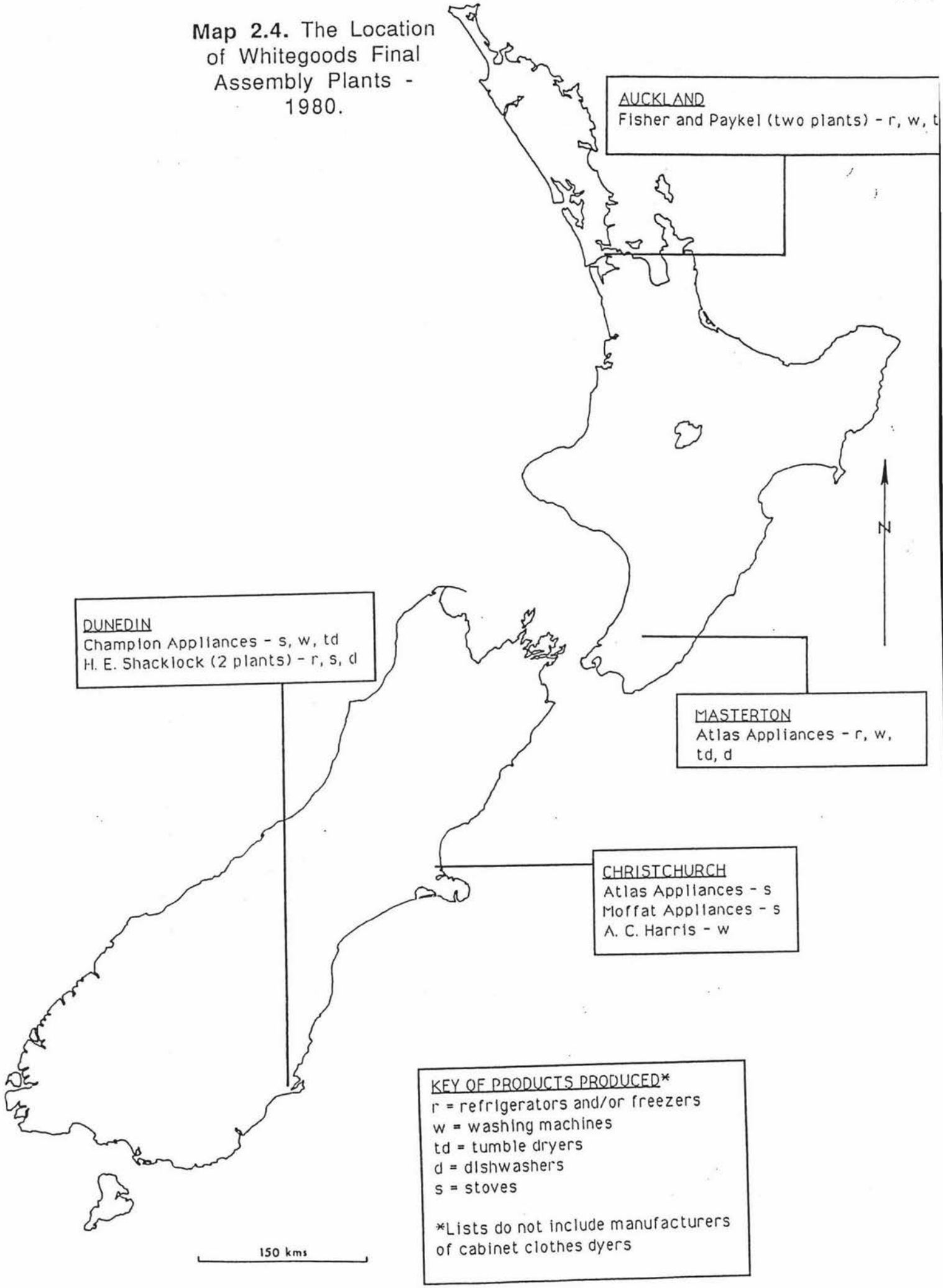
Map 2.2. The Location of Whitegoods Final Assembly Plants - 1964.



Map 2.3. The Location of Whitegoods Final Assembly Plants - 1972.



Map 2.4. The Location of Whitegoods Final Assembly Plants - 1980.



the high level of aggregate demand of the immediate post-war years did not dissolve after the movement back to a peacetime economy, and the revolution in consumption patterns that this prosperity engendered was reflected in the continual expansion in the ownership of whitegoods throughout the 1950s and 1960s (see table 2.2).

Table 2.2. Proportion of New Zealand Households with Certain Electrical Appliances - Various years*

	1945[11]	1956	1961	1966	1971
Electric Ranges	32.8	62.0	73.6	81.9	86.6
Refrigerators	--	53.6	64.6	91.0	96.3
Washing Machines	--	56.2	77.1	86.6	90.5

* The table does not include those dwellings with shared use of these appliances. In all cases shared appliances accounted for two percent or less of the total dwellings with appliances.

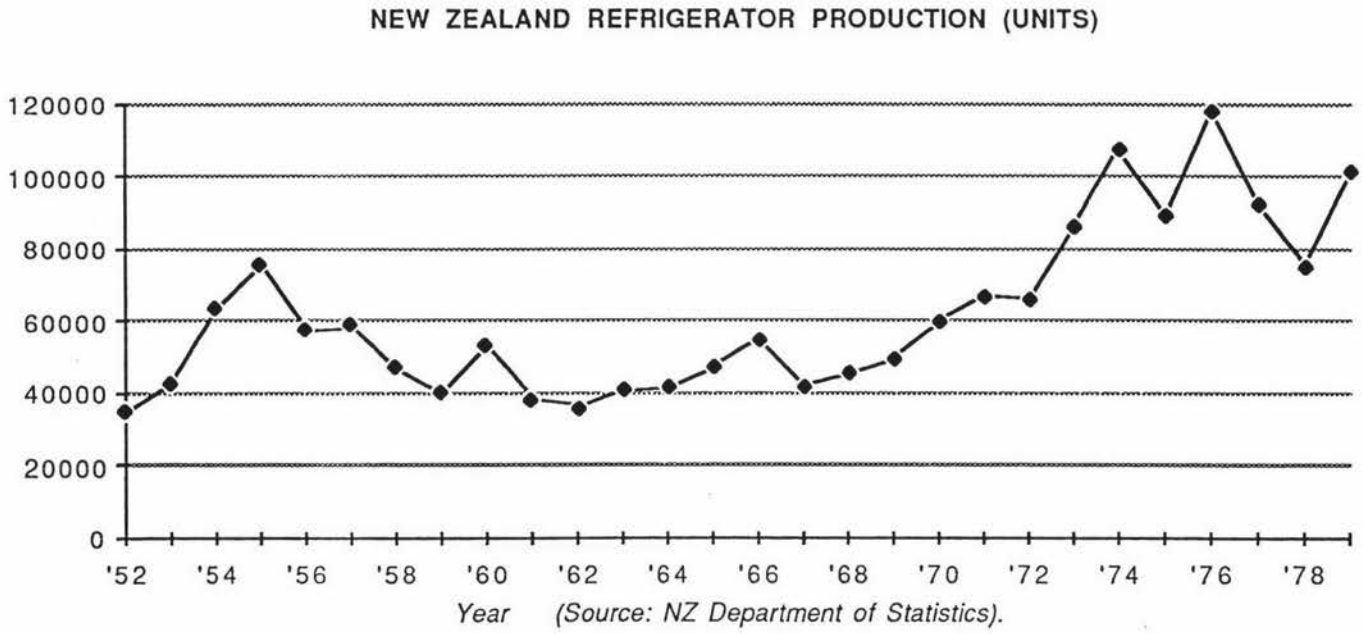
(Source: NZ Department of Statistics).

Up until the mid 1950s whitegoods production across all product ranges expanded in response to the high levels of demand (see figures 2.2-2.8).[12] However, the general pattern of expansion for both ranges and washing machines was upset by the relaxation of import licensing restrictions on these goods in 1952 and 1954 respectively, as the National Government moved away from quantitative protection in favour of tariffs. Still the impact of the removal of import licenses was not dramatic. Imports of ranges peaked at 4.2 percent of total supplies in 1955 and declined thereafter to 0.4 percent in 1958, whilst for washing machines imports managed to capture 17 percent of the market in 1956 before settling at 14

11. Although there are no ownership figures for either washing machines or refrigerators prior to 1956 it is possible to get a sense of the level of ownership of these goods in the early 1950s by comparing production and import figures for the years 1952-55 (1952 being the first year that production figures for both these goods became available). In 1956 there were 301 565 dwellings with refrigerators, of which 72 percent had been purchased between 1952 and 1955, whilst there were 316 511 dwellings with washing machines in 1956 of which 63 percent had been purchased between 1952 and 1955 (NZ Department of Statistics).

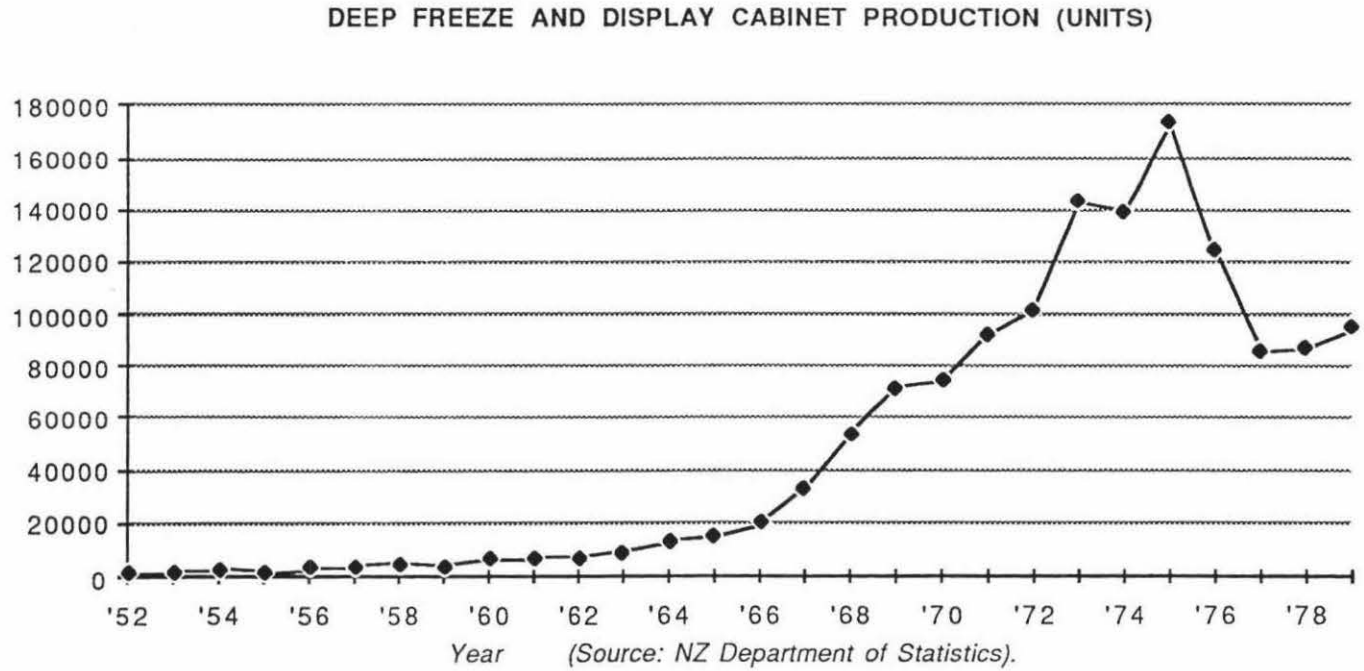
12 Figures 2.2-2.8. are the complete data series available for the out-put of whitegoods in New Zealand. The series was discontinued in the early 1980s to protect company confidentiality (NZ Department of Statistics).

Figure 2.2.



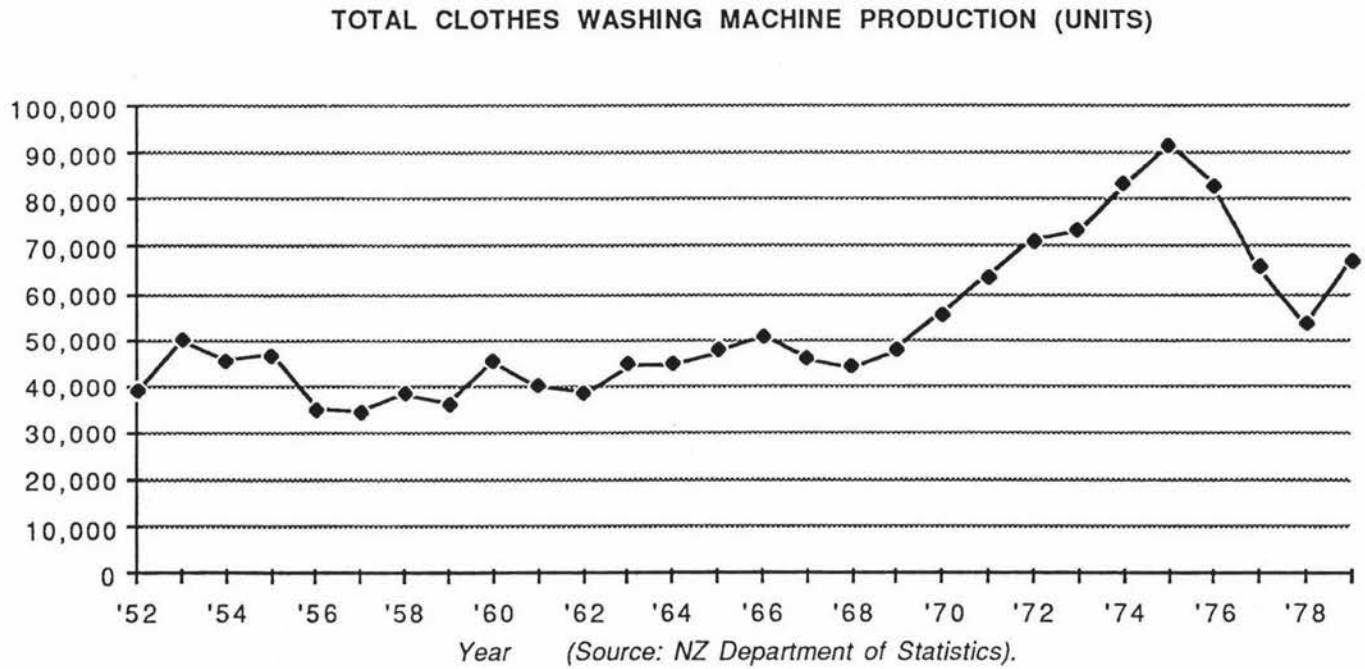
(Source: NZ Department of Statistics).

Figure 2.3.



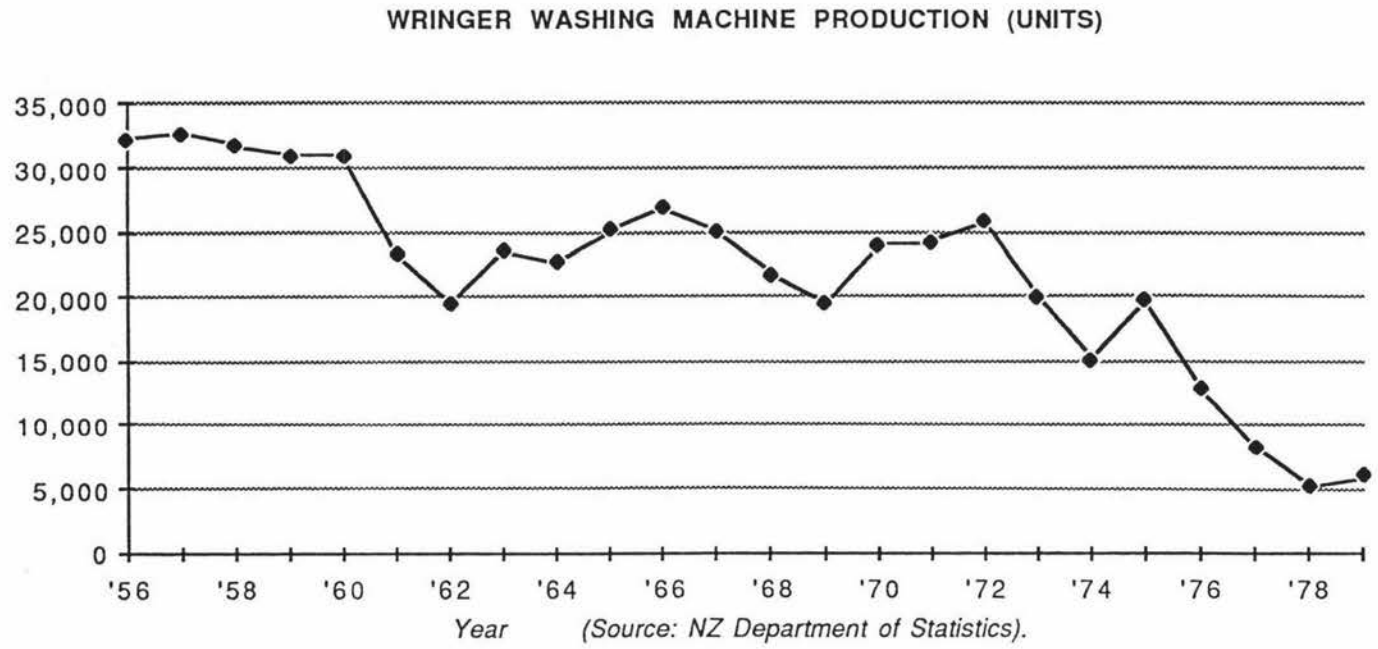
(Source: NZ Department of Statistics).

Figure 2.4.



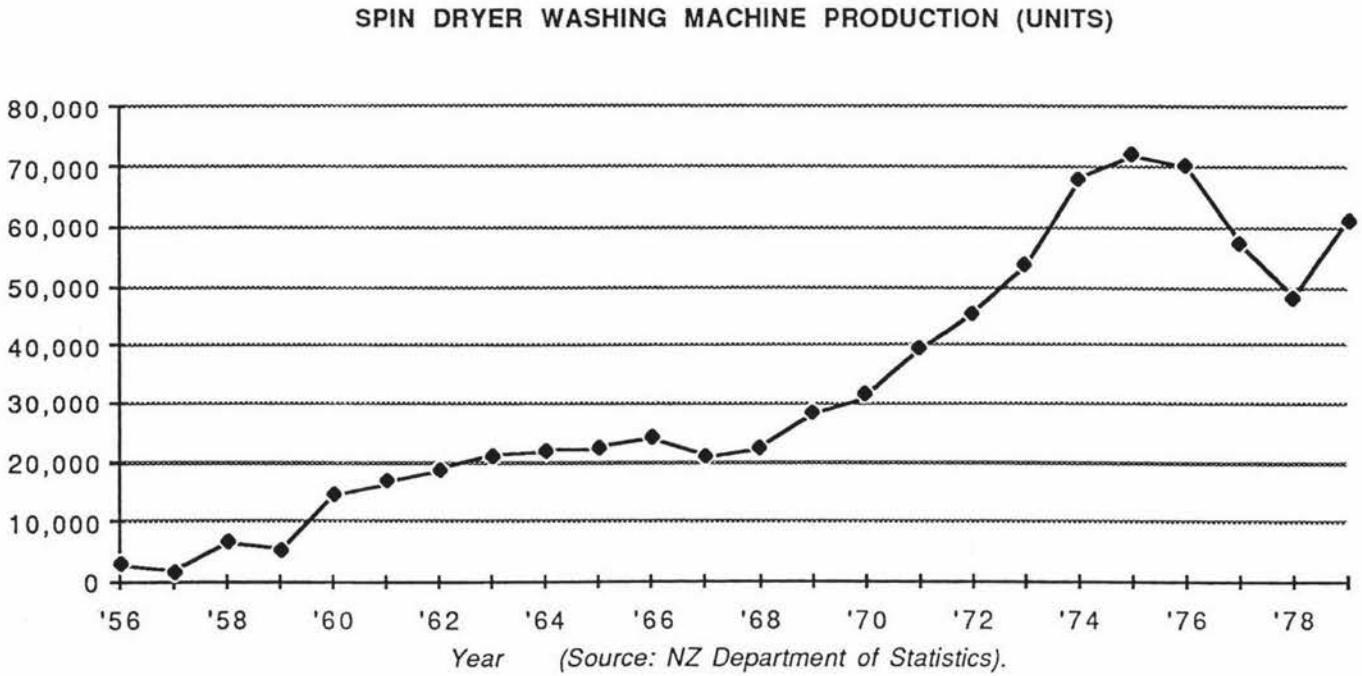
(Source: NZ Department of Statistics).

Figure 2.5.



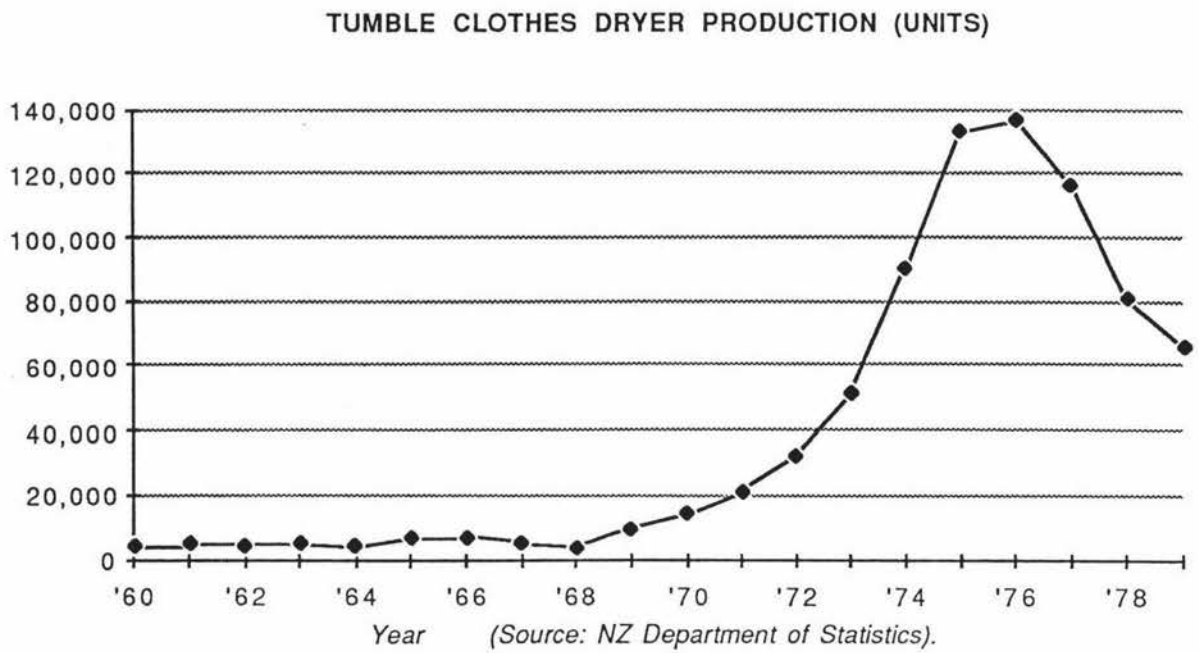
(Source: NZ Department of Statistics).

Figure 2.6.



(Source: NZ Department of Statistics).

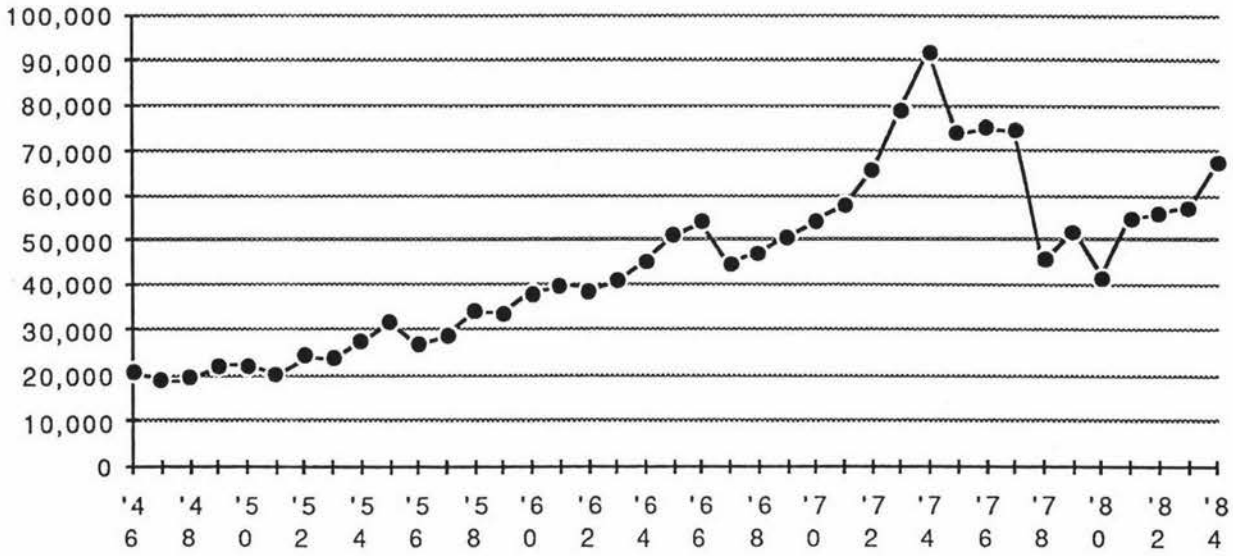
Figure 2.7



(Source: NZ Department of Statistics).

Figure 2.8

NEW ZEALAND ELECTRIC RANGE PRODUCTION (UNITS)



(Source: NZ Department of Statistics).

percent in 1957 and 1958. The limited impact of the removal of tariff barriers suggests that both these products had managed to achieve a level of efficiency that was not dissimilar to those prevailing internationally, although it should be noted that the prevailing tariff rates were substantial ranging from 20 percent for the British preferential tariff to 45 percent for the general tariff (Sewell 1965, pp 56-59. NZ Department of Industries and Commerce 1956, appendix A).

Comprehensive import licenses were restored in 1958 in response to the 1957 foreign exchange crisis. By this time, however, the pattern of development within the industry was becoming more complex (see figures 2.2 -2.8). In part this complexity can be attributed to the fact that by the latter half of the 1950s the markets for the three basic whitegoods products - ranges, refrigerators and washing machines - were becoming increasingly mature; that is a significant proportion of households possessed these products. The maturing of the market, combined with the durability of these products and their relatively high cost, meant that the market for whitegoods became increasingly sensitive to cyclical movements within the economy, as well as to state policies to influence credit formation in response to these movements (Sewell 1965, pp 38-48).

More significantly the increasing complexity within the industry was a reflection of the increasing diversity and sophistication of both the products being produced, and the processes being used to produce them. Before discussing these developments is necessary firstly to introduce some basic concepts on the nature of technological change to help structure the discussion.

Technological Trajectories and Paradigms

Over long periods of time any given industry will tend to develop along a relatively stable, well defined technological trajectory. The predictability of these trajectories is a function of the imperfect nature of the informational environment which exists within individual companies and industries. When seeking to solve a given technological and organisational problem companies do not, indeed cannot, examine the complete range of solutions that may be possible. Rather the search for solutions to a problem, and indeed the very definition of what constitutes a problem, will be structured around a number of key principles which have been successfully employed in the past to solve similar problems. Sets of principles such as these, and the types of questions and solutions they

generate, may usefully be called technological paradigms (Dosi 1982. 1988, pp 223-225. Arthur 1988).

At certain points in time the articulation of some of the defining principles of a technological paradigm will become problematic, that is they will no longer provide satisfactory solutions to the technological imperatives faced by the firm. This situation may come about for either of two reasons. The paradigm may reach a point where it no longer provides adequate answers to the questions it generates. Alternatively, as a result of modifications within the environment which firms are operating the paradigm may become unable to generate questions that are relevant. In such situations the overall veracity of the paradigm is brought into question, and as result those companies who have been operating within it will be forced to widen their information field in attempts to find alternative principles which do offer effective solutions. During such periods the future trajectory of the industry, and of those firms within it, becomes indeterminate. Not only will all firms not arrive at equally efficient solutions, but at the same time such breaks offer a unique possibility for new innovative firms to enter the industry. In time, however, the discovery and dissemination of new superior technological and organisational principles will lead to the formation of a new dominant technological paradigm and hence a another period of relatively stable technological and organisational patterns (Dosi 1982. 1988, pp 223-225. Arthur 1988).[13]

The concepts of technological paradigms and trajectories provide a useful starting point for analyzing the dynamics of technological change within a company or industry. It is necessary, however, to sharpen the analytical focus of these concepts by recognising that technological

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13. The concept of a technological paradigm provides an important link between the macro-technological concept of a technological system (see chapter one) and the technological strategies pursued by individual firms. Thus technological paradigm is a meso-technological concept, that can be usefully applied in the analysis of well defined product groups (that is an industry). In contrast a technological system refers to the dominant technological axes along which a group of inter-connected industries are developing. A technological system can thus be seen as the summation of a number of inter-related technological paradigms which together form a coherent whole, which progress along a well defined overall trajectory (Dosi and Orsenigo 1988, pp 21- 25. Dosi 1988, pp 225. Blackburn et al. 1985, pp 69-76. Marshall 1987, pp 33-35).

Given these definitions it must be stressed that the concept of technological paradigm as used here should not be equated with that used by Piore and Sabel (1984) in The Second Industrial Divide. Nor should it be equated with Freeman's, Perez's and Soete's techno-economic paradigms (Perez 1985. Freeman and Soete 1987. Freeman and Perez 1988).

development within an industry moves along two principal axes; the technology embodied in the final product, and the processes utilised in the manufacturing of that product. Obviously the two axes are interrelated. Still the articulation and elaboration of both product and process technologies are to a certain extent independent; the prevailing process technologies will allow some latitude in the development trajectory within product design, and vice versa. Moreover, a product or process will consist of a range of sub-systems each of which will also exhibit some independence from other systems. Thus it is useful to view a technological paradigm as a hierarchical collection of sub-systems or sub-paradigms (Dosi 1982, pp 151-157. Sahal 1985, pp 62-71. Saviotti and Metcalf 1984, pp 142-144).

The Post-war Technological Paradigm

As has been seen, prior to 1938, except for the limited manufacture of electric ranges, there were no companies involved in the manufacture of whitegoods in New Zealand. As a result when foreign exchange restrictions made it necessary to manufacture these goods locally, New Zealand manufacturers had no direct (or in the case of electric ranges only limited) knowledge of how to either design or manufacture these goods. To bridge this knowledge gap it was necessary for prospective manufacturers to plug in to the accumulated knowledge of American and European producers, and most New Zealand based companies entered into production agreements with overseas manufacturers (see plate 2.1). These agreements varied in form from the purchase of knocked down kits requiring only a minimal level of local input to the acquisition of design and technological assistance. At the same time the absence of any local industry encouraged a number of overseas whitegoods manufactures to establish production facilities in New Zealand (Sewell 1965, pp 26-31. Tait 1959. Department of Industries and Commerce 1956, pp 11-12. Personal interviews).

The initial dependence upon overseas companies for technological support led to the widespread dissemination within the New Zealand industry of a set of production principles that underlay both the American and European industries (Sewell 1965, pp 104-109. Tait 1959. Personal interviews). These principles can be grouped under five general headings: formal, hierarchical organisation structures; highly fragmented division of labour; standardised components; use of dedicated machinery; and flow line production. These principles did not in fact originate from within the whitegoods industry, but rather were derived from innovations undertaken

at the turn of the century by a range of American manufacturers, the most significant of which was the Ford Motor Company. Given these origins the technological paradigm that the industry inherited from America and Europe may usefully be labelled fordist mass production (Aglietta 1987, pp 116-119. Hounshell 1984, pp 217-301. Corley 1966, pp 40. Sewell 1965, 104-108).

The articulation of the above principles by New Zealand manufacturers was shaped by both the youth of the industry and the small size of the local market. Although the defining feature of the industry's development during this period was the drive to achieve economies of scale, the scale of production never approached that of the larger American and European producers. Indeed whilst in the early 1960s total production of refrigerators in New Zealand was around 40,000 per annum, individual manufacturers in Italy and Germany were producing series of 500,000 or more (Sewell 1965, pp 105. ABIB 1983, pp 6-8). As a result manufacturing practices within New Zealand diverged from the ideal solutions suggested by the fordist principles.

The most notable divergence was the use of batch production, rather than pure continuous flow techniques. Batch production involved the sharing of processing and assembly facilities amongst a number of different product types. Hence, rather than producing a given model continually, a batch of say 1,000 units would be produced, and then production would switch to another model and so on. Usually this sharing was restricted to products of the same genre - different sizes and types of refrigerators for example - but in some cases it also involved mixing quite different products. Batch production did not preclude use of the flow principle as the order of processing and assembly will generally be the same for each model (plates 2.2-2.7 and 2.12). The need to change the tooling and settings of machinery for each new batch does disrupt the smoothness of the flow, however. And the wide range of models being produced limited the use of specialised process and transfer machinery (see plates 2.8-2.10) (Sewell 1965, pp 105-109. Tait 1959. Personal interviews). Nor did batch production preclude the development of an intensive - taylorist - division of labour, but the economies obtained from such an approach were lower than those possible within a more specialised factory (see plates 2.5 and 2.11-2.12). This was due to two factors. The transition from the production of one product to another disrupted production, and secondly it was necessary to train the workers in a wider range of tasks

than would have been the case in more specialised factory (Sewell 1965, pp 104-107).

Although the scale of production within New Zealand companies was small relative to American and European manufacturers, the complexity of the products being produced and the detailed division of labour on the shop-floor still necessitated the establishment of formal hierarchical organisational structures. The pattern of development of these organisational structures varied within the industry depending upon the dominant financial interest within a company and its prior history. Companies such as General Motors and Electrolux which were part of multi-national corporations transplanted the structures that had evolved in their country of origin. However, as they were closely integrated with their parent companies many of the higher level managerial and design functions remained off shore. Indigenous companies, most of which were closely linked to family capital, as they grew in size mimicked the managerial and planning structures of these companies (see appendices 2.2 and 2.3). Fisher and Paykel, for example, which had in 1938 been a family based importer of consumer durables, had by 1959 developed a detailed managerial structure...

> ...the plant manager delegates direct control of many activities to sub-managers and supervisors. Production planning is done by a group of office and factory executives... Heads of manufacturing divisions plan their own activities to fit in with the overall programme. Costing is entrusted to the constant care of a specially trained section. The supply manager and his staff handle the procurement of materials from overseas, arrangements with sub-contractors for the supply of items involving specialist production, and the scheduling of deliveries to correspond with the general production programme. The Personnel officer is responsible for maintaining staff at the required level and for their general welfare. Methods of work and operating procedures are constantly checked and revised by the specially qualified methods engineer (Tait 1959, pp A-72).

It should be noted that the movement away from informal, personalized organisational structures was not necessarily a smooth and painless process. H. E. Shacklock, for example, came close to bankruptcy in the mid 1950s when it shifted from the production of cast iron to pressed steel

ranges. The company not only lacked the technical and managerial expertise to orchestrate this transition, but it also lacked an adequate marketing and servicing network through which to sell its products, and it was only saved from bankruptcy by drawing upon the organisational expertise of Fisher and Paykel (Angus 1973, pp 64-68).

Moreover it should also be noted that in a number of key respects the organisational structure of the indigenous manufacturers differed from European and American companies. The relatively small size of the New Zealand companies restricted the size and hence specialisation of tasks within the managerial structure. More significantly the youthfulness of the local manufacturers meant throughout the 1950s many relied heavily upon overseas companies for design and production expertise, and hence had limited design teams. All the major refrigerator and washing machine manufacturers had close technical links with overseas companies, as did most of the range manufacturers (see appendix 2.3) (Tait 1959. Sewell 1965. Boyles 1988, pp 86). In some cases the input of local manufacturers to design was minimal. When Osborne Gas Stove Company introduced a pressed steel range in 1955 it purchased both the design and tooling from the Canadian company Moffat Appliances (Boyles 1988, pp 86).[14] In some of the larger companies the design input was more significant however. Fisher and Paykel, for example, developed a range of combination refrigerator-freezers during the late 1950s, but it still maintained close links with a number of American and English companies (Tait 1959, pp A-70. Personal interviews).

During the 1960s the design and production links between New Zealand manufacturers and overseas companies weakened as local manufacturers succeeded in internalising these functions.[15] Indeed in a number of areas the expertise of New Zealand manufacturers began to rival and even exceed that of their original patrons. Fisher and Paykel developed a pressurised clothes drying system that was patented throughout the world (Yarwood 1987, pp 75). Meanwhile H. E. Shacklock (aided by Fisher and Paykel) and Scott Brothers, companies with limited links with overseas manufacturers both developed internationally significant innovations. In

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14. Osborne Gas Co were not producing gas ranges by this stage.

15. It should be noted that the depth of commitment to local design varied greatly between companies. And within individual companies it varied between products. For example Radiation Appliances' stoves were locally designed (with some support from its English owners) but its washing machines were simple copies of overseas designs (Designscape. Personal interviews).

1963 H. E. Shacklock introduced a range which replaced the then standard enamelled pressed steel cabinet with a painted sheet steel wrap-around one. This not only significantly lowered the cost of producing the cabinet but also meant the chassis of the range could be lighter and hence cheaper (Angus 1973, pp 77). And Scott Brothers introduced the world's first thermowave domestic oven in 1970 (Personal interviews).

The Structure of Competition within the Industry

The articulation of the fordist system within New Zealand created a distinctive competitive structure. The emphasis upon economies of scale, the unifying feature of the fordist production system, led to increasing concentration within the industry during this period (see table 2.3 and maps 2.1-2.3). The trend towards increasing concentration did, however, vary somewhat between different product groups.

Table 2.3. Concentration Ratios, Number of Manufacturers, and Size Ratios* for Ranges, Refrigerators, and Washing Machines 1953-54, 1955-56, and 1961-62

	1953-54	1955-56	1961-62
Ranges			
Concentration ratio (three largest firms)	82	69	72
Total number of manufacturers	5	6	6
Size ratio of manufacturers	3.0	2.2	2.6
Refrigerators			
Concentration ratio (four largest firms)	79	80	93
Total number of manufacturers	18	19	10
Size ratio of manufacturers	13.2	15.0	20.0
Washing Machines			
Total number of manufacturers	14	15	9

* The size ratio is the average output share of the largest firms in the total volume divided by the average share of all other manufacturers

(Source: From Sewell 1965, pp 51).

The production of electric ranges had a direct lineage back to the colony's earliest foundry and engineering works. Indeed four of the five locally owned manufacturers were direct descendants of such enterprises. H. E. Shacklock (Dunedin) and Scott Bros (Christchurch) had established foundries in the early 1870s, and both had commenced manufacturing coal

burning ranges for the local market soon after. Similarly, Brinsley and Co (which changed its name to Radiation in 1930) established a foundry (in Dunedin) in 1896 which, amongst other things, produced a coal burning range. Whilst solid fuel ranges were dominant throughout the nineteenth century, the spread of electrical reticulation and (in some urban areas at least) of coal gas, had seen a steady shift towards electric and gas cookers. This shift led Brinsley and Co to introduce a gas range in 1919. And the late 1920s and early 1930s saw both H. E. Shacklock (1926) and Scott Bros (1931) introduce a range of electric stoves. Furthermore, a fourth company, The New Scott Stove Co, which had formed in 1925 as a break-away from the Scott Bros, commenced manufacturing gas stoves (under a new owner and with a new name, the Osbourne Gas Stove Co) in 1931 (Angus 1973. Tait 1959. p. A14-15. A29-31. Sewell 1965, pp. 27. Personal documents. Personal interviews).

In some respects the shift towards electric and gas stoves was unremarkable. The production of such stoves was in many respects very similar to that involved in producing a solid fuel range. Each of these companies continued to use cast iron plate in the construction of their electric and gas ranges. And the enamelling needed for these new stoves, was also by this stage being used for solid fuel ranges.[16] All the same the production and marketing of electric and gas ranges was sufficiently different from that of solid fuel ranges to lead to a major shift in the market position of each company. Most remarkably H. E. Shacklock which had dominated the market for solid fuel ranges met with little success with its electric ranges, whilst Scott Bros went from strength to strength (Angus 1973, pp 63-67. Tait 1959, pp A 30-31. Personal documents).

Despite the presence of these manufacturers (and National Electrical Engineering Company (NEECO) an electrical goods importer which had begun producing a pressed steel range based on an American design in 1933), the market for gas and electric stoves remained dominated by imports, and it was not until the introduction of import licensing that local production of non-solid fuel ranges took off (Sewell 1965, pp 27).[17] Yet whilst the introduction of import licensing led to a rapid expansion in the

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16. It should be noted that the use of enamalling for solid fuel ranges began around the same time as non-solid fuel stove production commenced. For example H. E. Shacklock installed an enamalling plant in 1926, whilst Scott Bros did so in 1931 (Angus 1973, pp 55. Personal documents. Personal interviews).

17 Of the 92,000 electric ranges in use in New Zealand in early 1940 only around 16,000 were local models (Sewell 1965, pp 27).

production of electric ranges, local production continued to be dominated by those companies who had been manufacturing stoves prior to the introduction of import licensing, along with The Osborne Gas Stove Co and Radiation (nee Brinsley and Co, which was now owned by a British appliance company) who had commenced producing electric ranges in the early 1940s as the market for gas stoves stagnated.[18] This high level of concentration continued, with a minor decrease in the mid 1950s when General Motors entered the market, throughout the 1950s and 1960s (Sewell 1965, pp 51. Angus 1973. Boyles 1988. Tait 1959. Personal interviews).

In contrast, the complete absence of local refrigerators and washing machine manufacturers prior to the introduction of import licensing, combined with the relative simplicity of producing (or rather assembling) these products encouraged large numbers of firms to enter the market during the late 1940s and early 1950s. Encouraged by the buoyant market for refrigerators and washing machines, most of these companies were either light engineering firms who were seeking to expand the scope of their manufacturing activities, or companies who had been involved in the importation of refrigerators and washing machines prior to 1938. The importance of scale economies quickly asserted itself however, and by the mid-1950s the refrigerator and washing machine markets were dominated by a small number of firms, a pattern that was accentuated in the late 1950s when the demand for both these products dropped sharply forcing many of the smaller companies to withdraw from the market (see appendices 2.2 and 2.3 and maps 2.1-2.3) (Sewell 1965, pp 52-59. NZ Department of Industries and Commerce 1956. Tait 1959).[19]

The trend towards market concentration, and the oligarchic competitive structure it created, was paralleled by a shift in the nature of competition within the industry away from pure price competition, towards competition based not only on price but also product differentiation. Thus the success or otherwise of a company became related to the regular introduction of new models at a price that was within, or below, the existing price parameters for that product (compare figures 2.5 and 2.6 for example). Periods of intense price competition did occur, but such periods reflected an absence of competitive equilibrium and as such generally

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18. Whilst 96,000 households had gas stoves in 1945 only 89,000 households had one in 1956 (NZ Census 1945. 1956).

19. Although detailed information is not available on the level of concentration in the washing market, by the early 1960s one firm - Fisher and Paykel -was accounting for over half of the total production of washing machines (Sewell 1965, pp 52-53).

preceded a period of reorganisation within the industry (Sewell 1965, pp 79-86). This oligarchic competitive structure characterised by short term price stability, the regular introduction of new models, underpined by the macro-economic stability within the New Zealand economy during the 1950s and 1960s, neatly dovetailed with the requirements of the fordist production systems within the industry. In providing a stable competitive environment it allowed both for the steady and predictable amortisation of the initial developmental and tooling costs, as well as an environment in which the long term production planning required for batch production could be reliably undertaken (Sewell 1965, pp 79-86. 135-136. Personal interviews. Dunford 1990, pp 315-316. Schoenberger 1988, pp 250-251).

A Shifting Focus - the Industry in the 1970s

Whilst the 1950s had seen major shifts in the volume of demand for whitegoods, and in the level of concentration within the industry, the 1960s had been marked by relative stability. Despite the rising level of affluence throughout the 1960s the market for each of the established product groups were generally stagnant.[20] And although several firms did leave the industry and a few others joined it, the structure of the industry changed little during the decade (see maps 2.2 and 2.3).

In contrast, the first half of the 1970s saw an expansion in the demand for the three main product groups as well as for deep freezers and tumble dryers, both products which had been produced in only relatively small, but not insignificant, volumes until the late 1960s (see figures 2.2.-2.7). Yet this expansion did not continue into the second half of the decade. Whilst the first half of the 1970s had seen household incomes rise faster than in any other time during the post-war period, the second half of the decade saw incomes stagnate, as the economy swung sharply form expansion to recession (Chatterjee 1988, pp 29. NZ Department of Statistics). As a result the late 1970s and early 1980s saw the closure of all but one of the smaller companies, as well as two of the industry's largest companies (see table 2.4, maps 2.3 and 2.4, and appendices 2.4 and 2.5) .

In part the wholesale closures within the industry can be seen as continuation of the underlying trend within the industry towards a greater level of concentration. The picture is complicated, however, by the fact

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20. Although the decade did see a shift in the composition of demand towards larger and more sophisticated goods; towards larger refrigerators and semi-automatic and automatic washing machines for example (see figures 2.2-2.8) (NZ Department of statistics).

that a number of companies began in the late 1960s and early 1970s to export a significant volume of their production to the Australian market (see table 2.5).

Table 2.4. Number of Manufacturers of Whitegoods - 1972, 1980, and 1986

	1972*	1980#	1986##
Refrigerators-freezers	8	3	1
Automatic Washing Machines	3	3	2
Wringer Washing Machines	5	2	0
Total No of Washing Machine Producers	6	4	2
Tumble dryers	3	3	2
Ranges	5	4	4

* See appendix 2.4 and map 2.3 for further information.
\# See appendix 2.5 and map 2.4 for further information.
See appendix 2.6 for further information.
(Source: Consumer. Chas Begg Ltd. Atlas Majestic Industries Ltd. Atlas Industries. Fisher and Paykel. McAlpine Industries. Designscape. Otago Daily Times. New Zealand Herald. Christchurch Press).

The movement into exporting was mainly an extension of the competitive parameters of the New Zealand market. It is important to note, however, that despite the rising level of concentration within the washing machine and electric range markets during the 1970s neither of these products were exported in large volumes. Why then were refrigerators/freezers and clothes dryers exported in such numbers? In part this was simply conjunctural. The early 1970s had seen an upsurge in demand for refrigerators, chest freezers and tumble driers within Australia which Australian manufactures were unable to supply in the desired price range, creating an opportunity for New Zealand manufacturers. Indeed it is interesting to note that in the early 1970s the market for refrigerators and freezers, showed a notably lower level of concentration (at least in terms of manufacturers) than other products. By the mid-to-late-1970s, however, rationalisation within the Australian industry, combined with the commissioning of new production lines significantly eroded the

competitive position of New Zealand manufacturers within the Australian market.[21] Yet whilst this increased competition led to the collapse of several exporters, Fisher and Paykel not only maintained a significant presence within the Australian market, but also managed to use this success in to reinforce its dominance within the New Zealand market (see table 2.4) (ABIB 1983, pp 46-49. Rich 1986, pp 119. Commerce Commission 1989, pp 35. Atlas Majestic 1977, pp 4. Otago Daily Times. Personal interviews). Whilst it is tempting to view Fisher and Paykel's

Table 2.5. Exports of Whitegoods 1966-67 to 1980-81 - June Years (thousands of units)#

	1967	1969	1971	1973	1975	1977	1979	1981
Refrigerators/ Freezers	-- (47.6)*	-- (2 417)	29.6 (3 369)	56.8	92.9	86.9	82.4	88.1
Refrigerators	--	--	--	--	--	--	30.6	35.2
Freezers**	--	--	--	--	--	--	51.8	52.9
Washing Machines	-- (10.4)*	-- (83.5)	0.8 (86.8)	0.5	4.5	0.9	0.3	0.5
Clothes Dryers	--	--	--	--	--	--	67.8	19.4
Dishwashing Machines	--	--	--	--	--	--	2.8	1.3
Ranges	--	--	0.7	4.8	7.3	8.7	5.4	4.5

The level of disaggregation of the trade statistics varies through this period. Up until 1978 both clothes dryers and dishwashers were subsumed within the category of other electro-mechanical appliances.
* Figures in brackets are the value of exports in thousands of dollars.
** From 1967 to 1977 refrigerators and freezers were in the same category.
(Source: NZ Department of Statistics).

success as springing from the achievement of a level of scale economies which allowed it to compete outside the protected New Zealand market, this would be inaccurate. Certainly Fisher and Paykel was producing refrigerators, freezers, and clothes dryers in volumes as great or greater than the largest Australian manufacturers. More significantly, however, Fisher and Paykel had managed to achieve these volumes by developing

21. The Australian Government also introduced import licensing for refrigerators in 1975 and chest freezer in 1976 which didn't help matters any (ABIB 1983, pp 16-17).

(since the mid-1960s) production systems for refrigerators/freezers and clothes dryers which challenged the rigid relation between the length of product runs and the cost of the final product that existed within fordist production systems (Watson 1976. Manufacturer 1981. February 23, pp 8. Yarwood 1987. Personal interviews).

Still the significance of these new techniques was obscured during much of the 1970s as, although more volatile, the environment within which the industry was operating was in many respects little different to that of earlier years. Unlike previous down-turns, however, the recessions of the second half of the 1970s early 1980s were not followed by a return to stable and sustainable prosperity (Jesson 1988a. James 1986). This slide into an endemic state of crisis precipitated a desperate search for a new mode of growth during the 1980s, in the process vastly altering the competitive dynamics within the whitegoods industry.

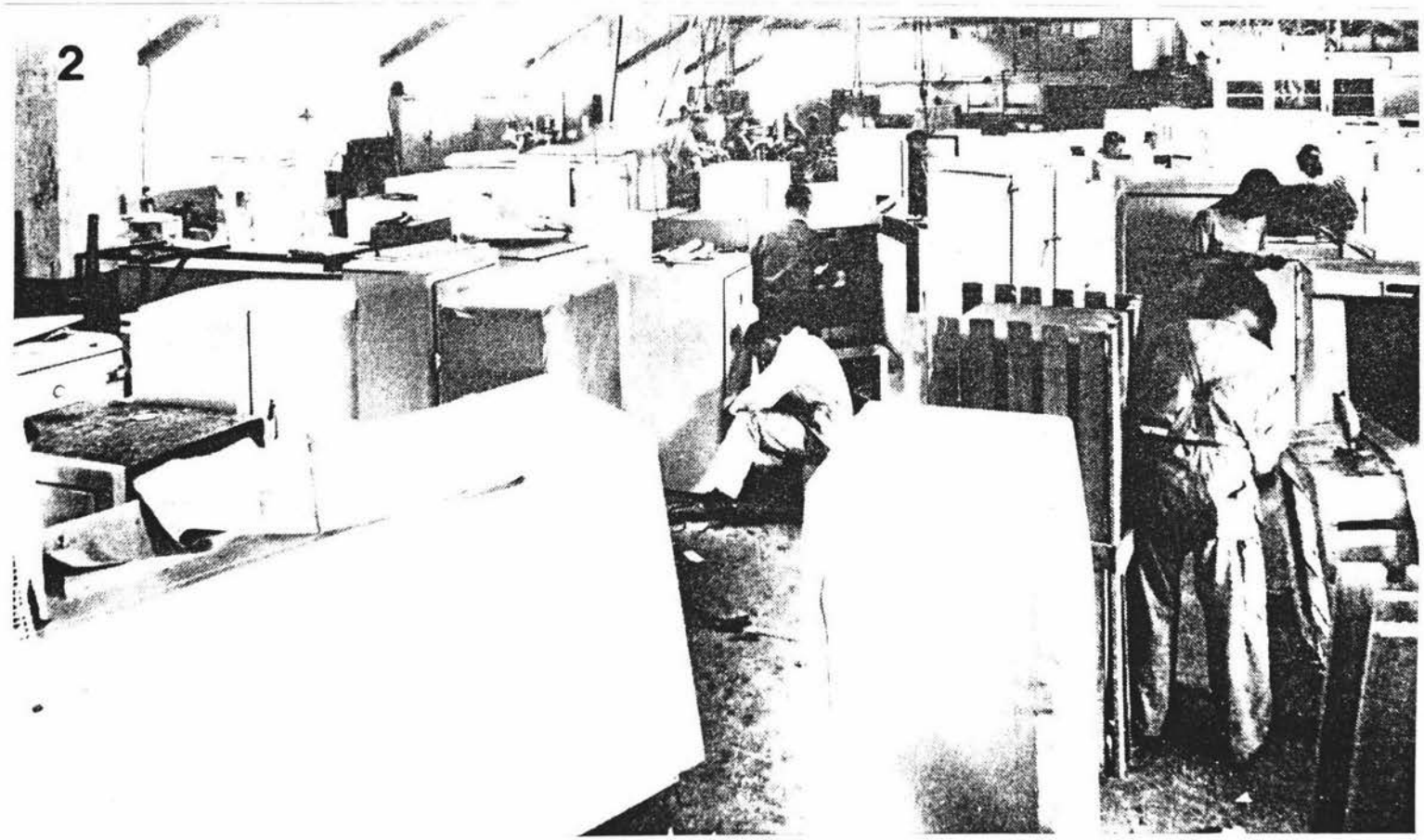

Plate 2.1. Assembly of Prestcold refrigerators from knocked-down-kits supplied from the United Kingdom at McAlpine Refrigeration - about 1950 (source. McAlpine Industries. 1985).

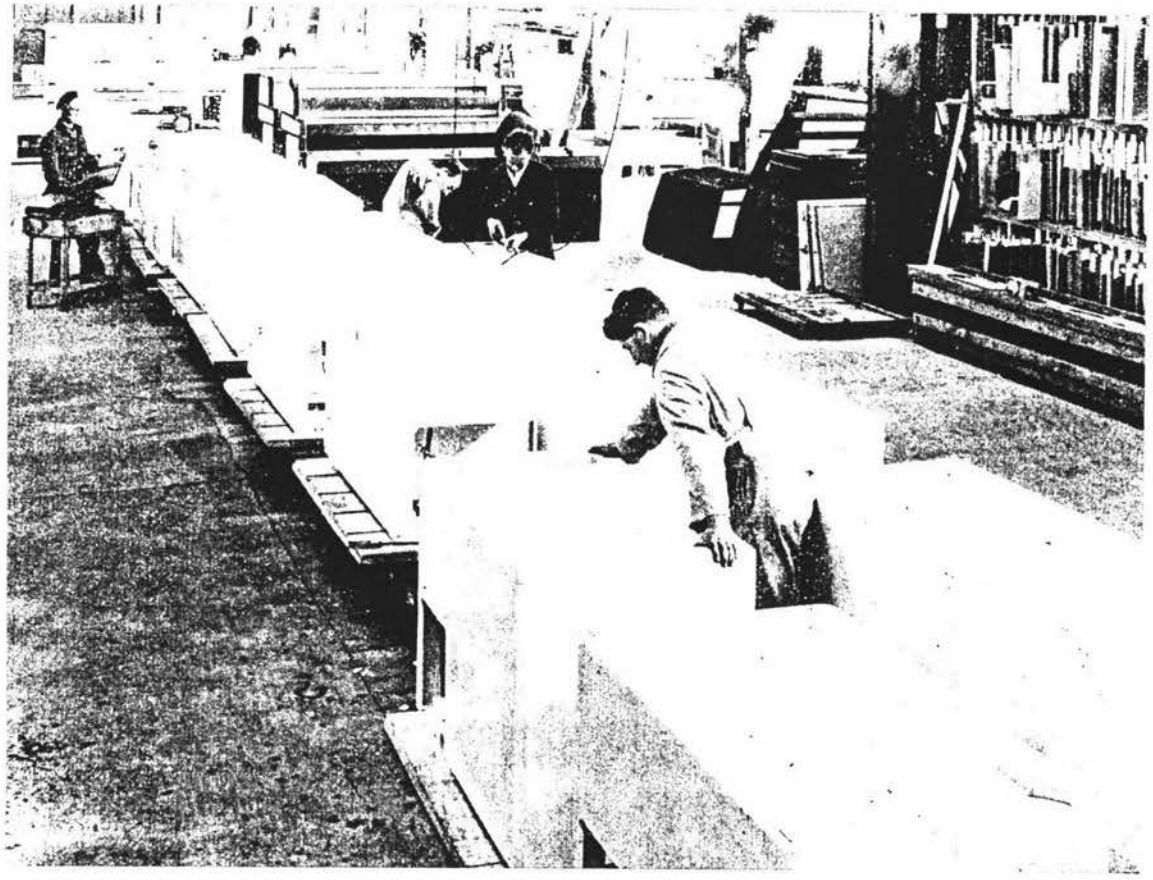

Plate. 2.2. Assembly of chest-freezers at McAlpine Refrigeration - 1959 (source. Tait. 1959. pp. A-82).

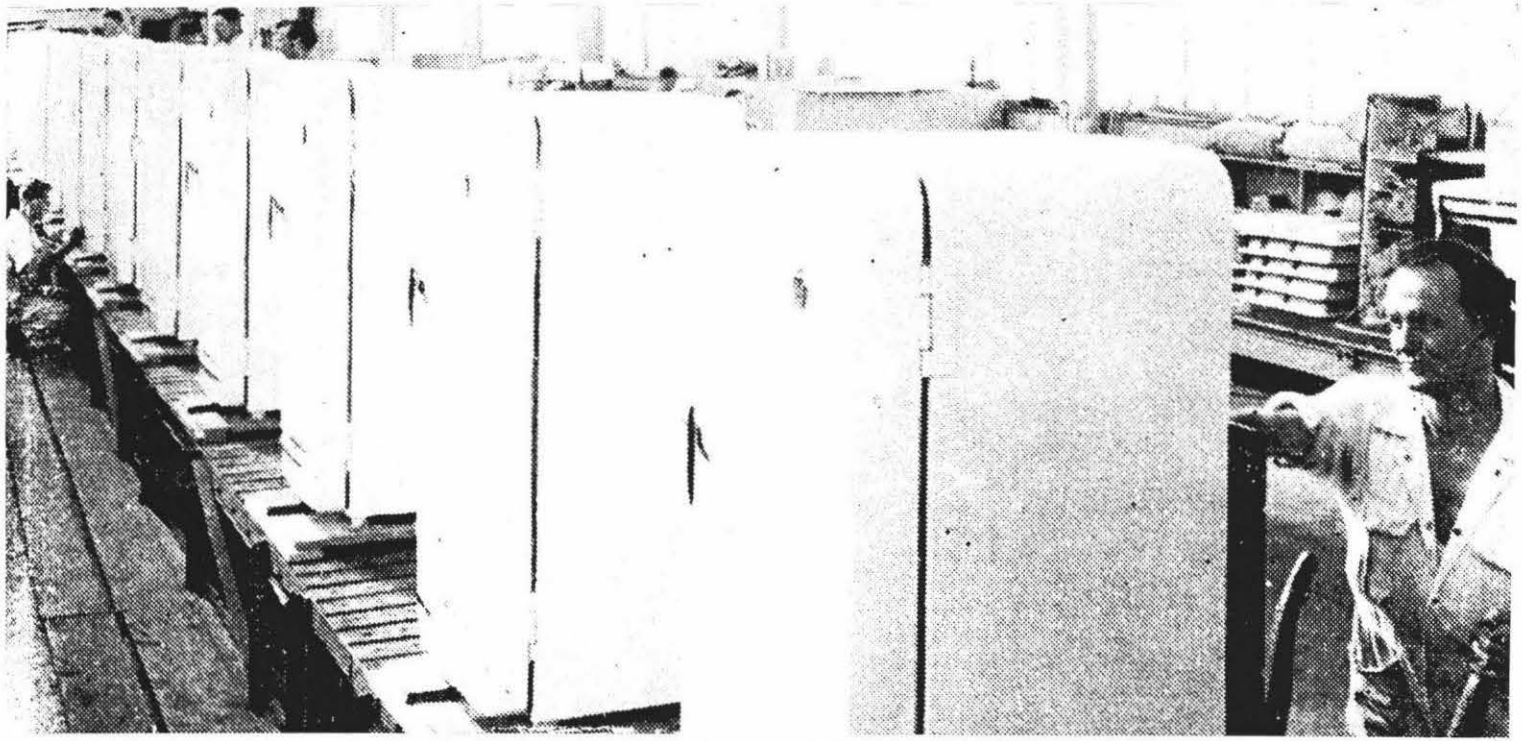

Plate 2.3. Assembly of refrigerators at Fisher and Paykel - 1959 (source. Tait. 1959. pp. A-71).

Plate 2.4. Assembly of dual-temperature refrigerators at Fisher and Paykel - 1959 (source. Tait. 1959. pp. A-70).

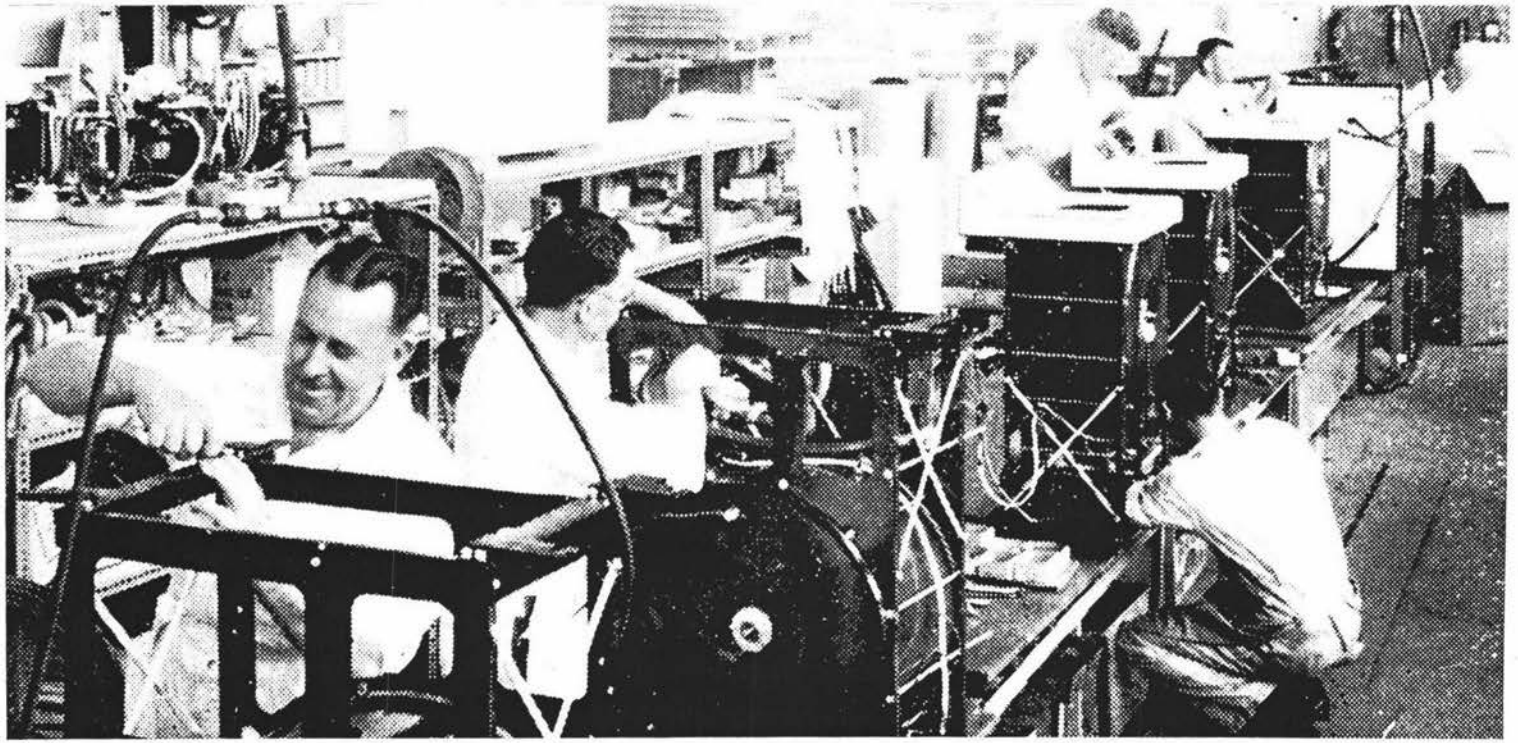

Plate 2.5. Assembly of washing machines at Fisher and Paykel - 1959 (source. Tait. 1959. pp. A-72).

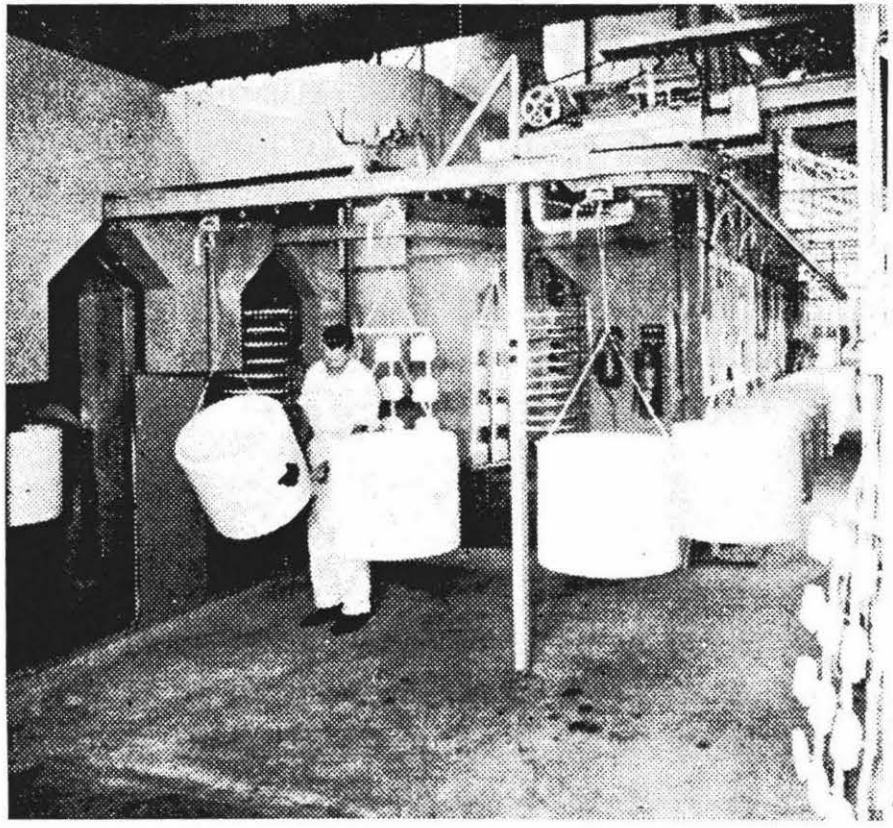

Plate 2.6. Washing bowls for wringer washing machines at Fisher and Paykel enter drying ovens after painting - 1959 (source. Tait. 1959. pp. A-71).

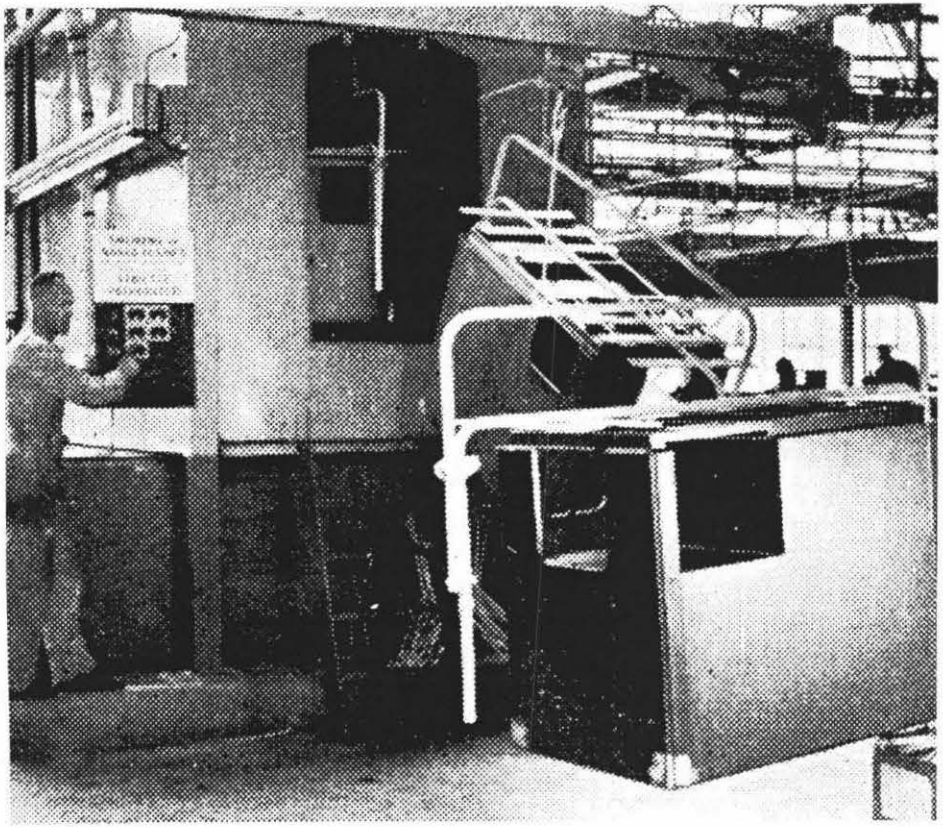

Plate. 2.7. Chest-freezer cabinets at Fisher and Paykel are degreased in a degreasing tunnel - 1959 (source. Tait. 1959. pp. A-71).

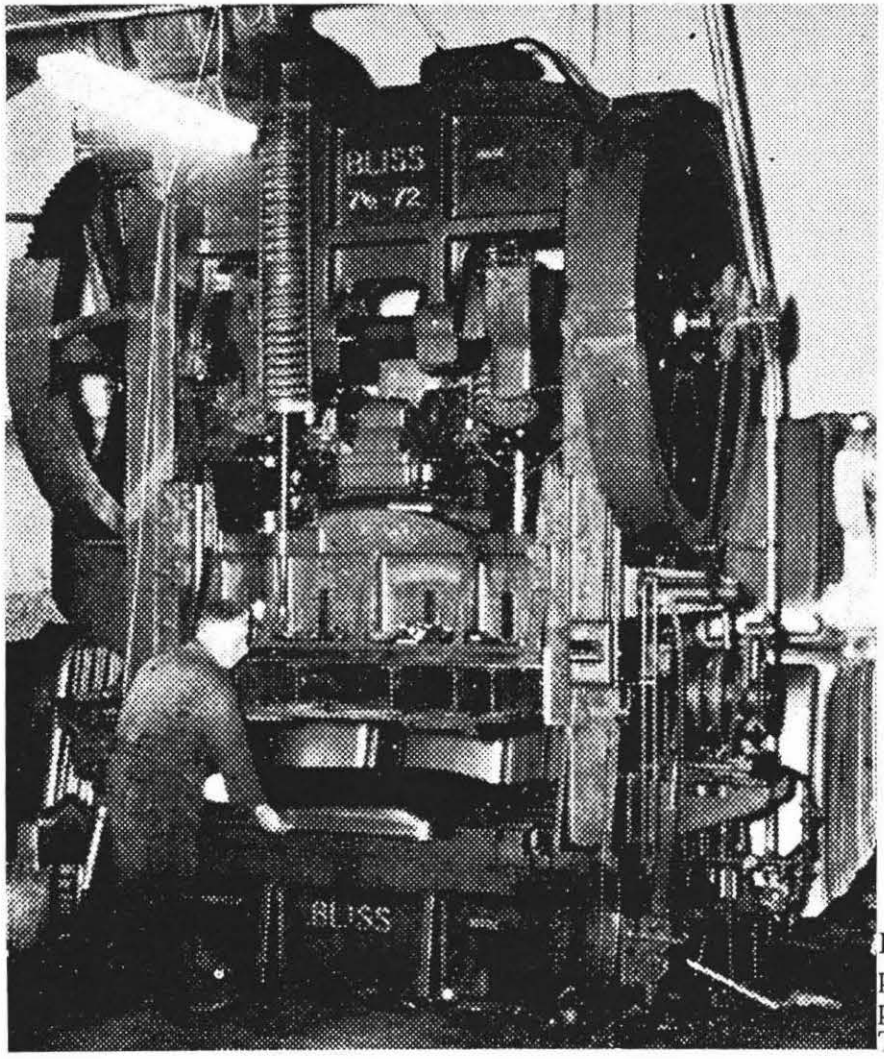

Plate 2.8. 250 ton sheet metal press used to press parts for refrigerators and laundry products at N. R. Cunningham - 1959 (source. Tait. 1959. pp. A-79).

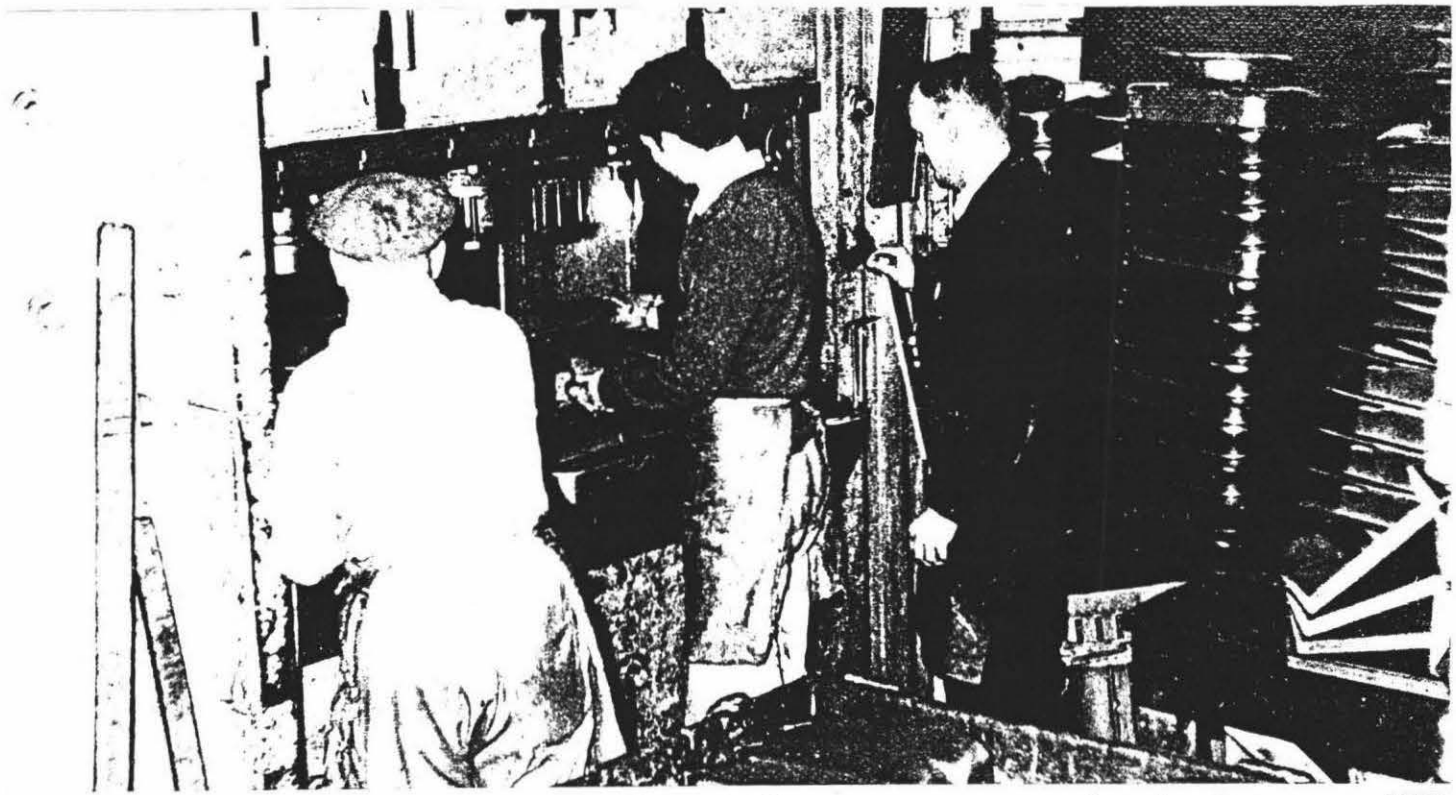

Plate. 2.9. 200 ton sheet metal press at Radiation (NZ) used to press parts for electric ranges - 1959 (source. Tait. 1959. pp. A-14).

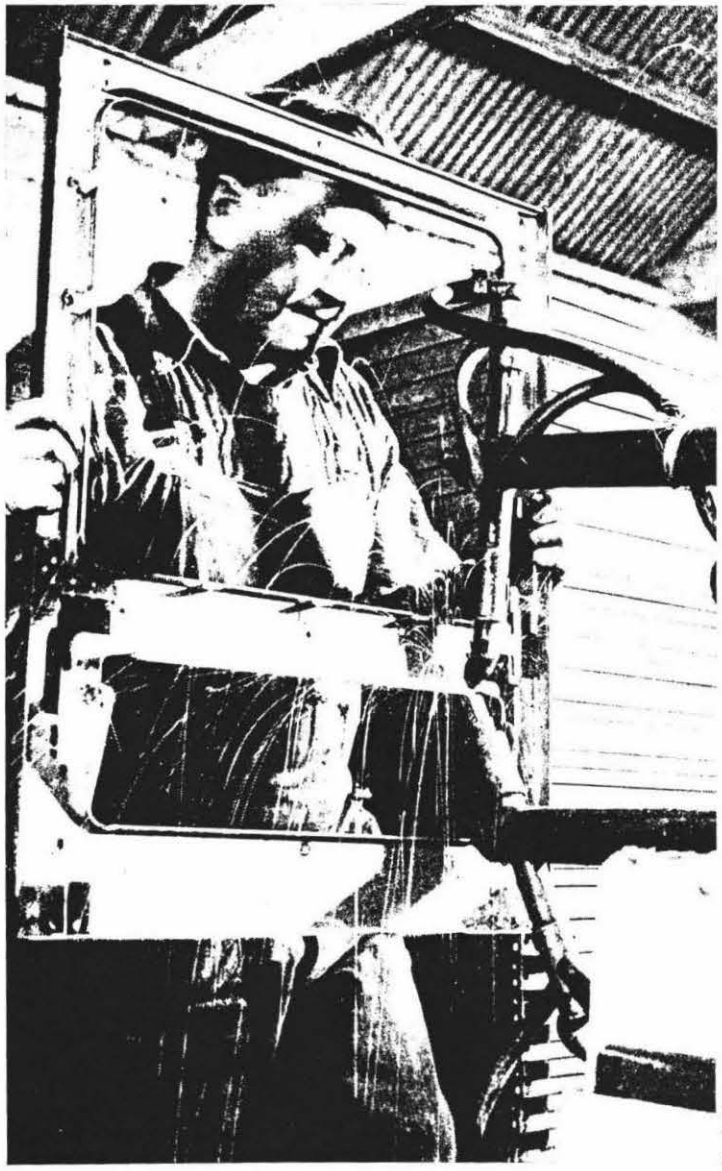

Plate 2.10. Spot welding an electric range front at Scott Bros - 1959 (source. Tait. 1959. pp. A-30).

Plate. 2.11. Assembly of oven elements at Radiation (NZ) - 1959 (source. Tait. 1959. pp. A-15).

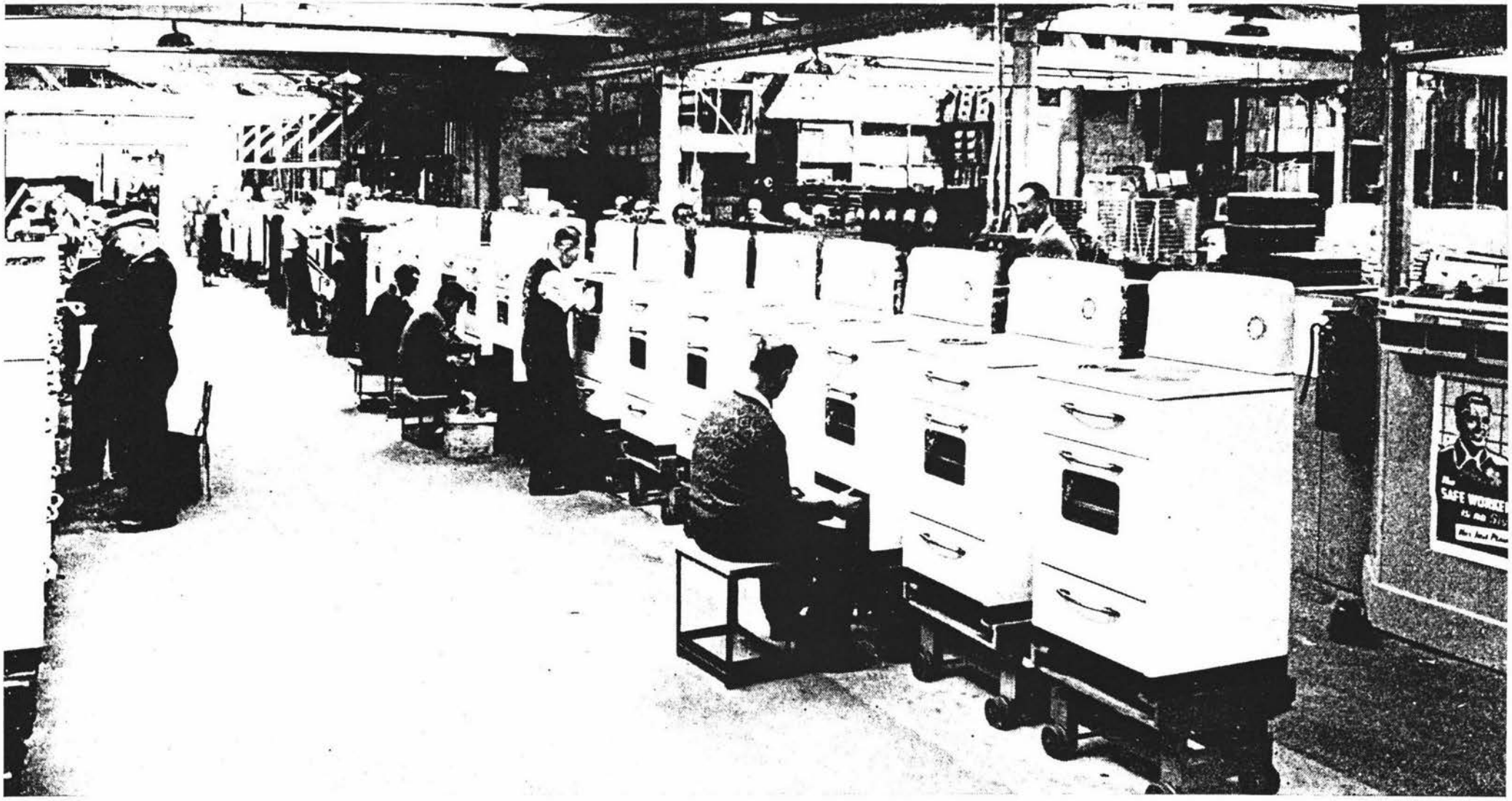

Plate 2.12. Assembly of electric ranges at Scott Bros - 1959 (Tait. 1959. pp. A-31).

CHAPTER THREE

The Search for a New Mode of Development and the Whitegoods Industry in the 1980s and 1990s Part I: Technological Innovation and the Changing Competitive Environment

"Toto, I have a feeling we're not in Kansas any more ..." (Dorothy arriving in Oz).

The post-war accumulation regime had been structured by the desire to create a high wage, mass consumption economy which mirrored the general patterns of the prosperous Western European and North American economies. Throughout the 1950s, 1960s and early 1970s New Zealand to a large degree succeeded in attaining this ideal. The country's prosperity, however, was founded upon an inherently unstable foundation.

During the late 1960s and 1970s, the precarious nature of the country's prosperity had become highly transparent. All at once the structures which had supported almost three decades of gentle prosperity seemed to be engendering exactly those conditions they were meant to thwart. Economic activity swung wildly from contraction to growth, and back to recession. Unemployment rose inexoriably. Inflation accelerated. And the country's foreign exchange balance shifted from deficit to surplus before settling stubbornly into a position of permanent deficit (Gould 1982). In part these imbalances reflected a sharp shift in New Zealand's external trading position. More importantly, however, they reflected a number of inherent contradictions within the institutional matrix which had structured the earlier prosperity.

The Disintegration of the Post-War Regime of Accumulation[1]

The post-war import-substitution industrialisation programme had been based upon a trade-off between employment and efficiency. It was accepted that the productivity of New Zealand manufacturing was lower than that of other advanced capitalist countries, but the costs of this lower efficiency seemed acceptable given the employment manufacturing created. What was not recognised, however, was that this trade off was dynamic, varying through time depending upon the productivity growth of New Zealand manufacturers vis-a-vis those of other industrial countries. Throughout the 1950s and 1960s this trade off became increasingly costly. This reflected both the rapid productivity growth within the advanced capitalist economies (Boyer 1988c, pp 20. Harvey 1989b, pp 130-132), and the emergence of a number of Asian and South America countries who by virtue of their low wage costs, managed to undercut the prices of the industrialised countries in industries such as textiles, apparel, footwear, and consumer electronics (Dickens 1986. Lipietz 1987).[2] Hence by the mid-1970s the employment-price-growth trade off had not only become highly unfavourable but also, and more importantly, highly visible (Franklin 1978, pp 128-133. Hawke 1985, pp 176).

Moreover, the growing affluence of the 1950s and 1960s had created a range of increasingly diverse consumer demands that were inconsistent with the logic of post-war industrialisation programme. Throughout this period consumption had been focused upon the suburban household within which life revolved around the use of such consumer durables such as the automobile, refrigerator, washing machine, and television. Initially, social

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1. Although the discussion refers to the post-war regime of accumulation, given that several of the innovations that were central to the regime were established prior to the war, this term is somewhat misleading (see chapter two). However, the facts that the industrialisation programme was not given coherence until after the war, and that the political consensus that held the regime together was not fully consolidated until the early 1950s, the use of the phrase seems valid. Furthermore, the term Fordism which is frequently used to label accumulation regimes (as opposed to the more specific meaning used in chapter two) in other advanced industrial countries during these years, has been avoided because in a number of important respects the dynamics of the New Zealand economy during the post-war period differed from those economies. (For an analysis which sticks closely to overseas studies see Roper 1991a. 1991b).

2. It should be noted that the success of Asian and South American countries was, initially at least, restricted to the production of relatively cheap standardised products (Dickens 1986. Lipietz 1987). It should also be noted that although low wages were the most visual advantages these countries had vis-a-vis the advanced industrial countries, the most successful of these countries had also developed a range of innovative (but not necessarily socially progressive) capital-labour, capital-state relations that were substantially different to those existing in the advanced industrial countries (see for example Amsden 1990).

status accrued from the simple fact of ownership of these products. As income levels rose and ownership became more universal, however, the status ascribed to ownership of these products came to depend increasingly upon the type of product owned - the brand, the styling and so forth. Up to a point this trend could be accommodated by local companies, supplemented by the limited importation of those products the local industry could not produce. But as demand became more highly differentiated the ability of local industry to supply this variety ground up against the scale barriers imposed by the small size of the New Zealand market. And there in lay the contradiction. To satisfy the new consumption norms required the reduction of border constraints, but any such reduction would undermine the competitive position of existing industries whilst placing pressure upon the country's foreign exchange balance.

Although the limitations of the introverted post-war industrialisation programme were becoming apparent by the late 1960s, it took an external shock to create the imperative for a wholesale reconstitution of the structures which had supported this pattern of industrial development (Franklin 1978, pp 126-127).

By the late 1960s the global economic expansion that had provided the favourable trading conditions which had underpinned the post-war industrialisation programme began to dissolve (Aglietta 1982. Armstrong et al. 1984. Harvey 1989b, pp 143-147). Initially, this crisis in the international regime seemed to be merely a normal cyclical downswing, albeit a rather sharp one. Indeed, although New Zealand experienced a sharp decline in its trading position during 1967/68, in the early 1970s the country's terms of trade swung sharply upwards. In 1974 the oil shock and the slow down in international growth that this (at least in part) engendered, caused New Zealand's terms of trade to again fall sharply, and this poor trading position continued throughout the rest of the 1970s and into the 1980s. The net result of these developments was that in contrast to earlier years when New Zealand had maintained a balance of payments that was broadly in balance, from the mid 1970s onwards the New Zealand economy experienced constant and sizeable foreign exchange deficit (James 1986, pp 57-61. NZ Planning Council 1989, pp 9-11).

In essence a solution to these exchange crises was simple; the country needed to create a range of new industries capable of competing internationally. Yet the ability to do so was constrained by the introverted nature of the post-war industrialisation programme. As the preceding

discussion has already stressed, the industrialisation programme had rotated around the desire to foster employment rather than any notion of whether the industries established were, or could potentially be, internationally competitive. Hence the ability of many of the industries which had developed within this environment to move into foreign markets were limited. More importantly - although closely related to the first point - the post-war system of tariff barriers and import licences had created an industrial milieu that made it difficult for those firms which were capable of developing export markets to do so successfully. Not only had they created a price structure that was widely out of line with those required to be internationally competitive, but these prices were largely impervious to movements within the world-economy (except indirectly via the impact of pastoral exports) (Franklin 1978, pp 128-132. 1985, pp 99. NZ Planning Council 1989).

Thus by the mid-1970s importing licensing and the institutions associated with it rather than fostering a mainstream, high income, mass consumption economy, were guiding the economy into an ever deepening mire of mediocrity. Yet despite the increasingly obvious shortcomings of the post-war institutional matrix, the ability of the state to forcefully modify this matrix was tightly constrained by the strength of the political alliances that this matrix had created (Franklin 1985, pp 94-102). Hence most of the state initiatives during the 1970s and early 1980s involved little more than crisis management: borrowing in the hope that future improvements within the international economy would allow New Zealand to return to a growth trajectory similar to that which it had followed during earlier decades (Jesson 1987, pp 63. James 1986, pp 73-74). Certainly some initiatives were undertaken to confront the difficulties. There were a number attempts to deregulate industry (Bollard and Buckle 1987). Tax incentives for new exporters were increased. And in the late 1970s and early 1980s a general but limited movement towards trade liberalisation occurred, a trend that was accelerated in 1983 with the signing of the Australia New Zealand Closer Economic Relations Agreement (ANZCERA) (Franklin 1985, pp 101. James 1986, pp 75. Wooding 1987, pp 92-97). More dramatically, the National Government attempted to circumvent the foreign exchange crisis by sponsoring a range of large scale industrial initiatives in the hope of both increasing exports and decreasing imports. Still, despite the grandeur of the projects undertaken the logic behind this industrialisation programme was rooted in a desire to support the existing

structure of accumulation rather than a desire to transcend it (Easton 1989, pp 119-121. Franklin 1985, pp 98-99).

Yet these initiatives were incapable of restoring coherence. The inability of the propulsive industries of the post-war period to create new employment continued. Tax incentives for exporters created a shadow 'rip-off smart money economy' (Jesson 1987, pp 64). And the continual fiscal and external deficits not only fed into the inflationary spiral that had developed in the early 1970s, but also exacerbated the exchange crisis. By the early 1980s the structural imbalances within the New Zealand economy had become so chronic, and the political deadlock so suffocating, that state intervention degenerated into a series of desperate ad hoc ministerial interventions which attempted to restore balance by sheer force of will, rather than by recourse to rational economic arguments (Franklin 1985, pp 101-102. James 1986, pp 73-76. 101. 169. Jesson 1989, pp 63-64). Ironically it took the election of a Labour Government in 1984 to break this deadlock.

Traditionally the Labour Party had been an advocate of both protectionism and state intervention. By the early 1980s, however, shifts within the occupational structure over the past decades combined with the populist policies of the Muldoon National Government (elected in 1975), had eroded the significance of Labour's traditional working class base whilst increasing the importance of the salaried middle classes. This introduced a complex dynamic into Labour's search for a viable economic policy. Although Labour's middle class support was derived from the party's social liberalism, many of these middle class supporters were sceptical of the efficacy of widespread economic intervention. Hence the party's debate over economic policy in the months prior to the 1984 election became polarised between those who favoured such intervention and those who advocated wholesale economic deregulation (Vowles 1987, pp 23-31. Jesson 1989, pp 48-62. Oliver 1989).

In the event deregulation won through. The Labour Government's initial movements towards deregulation were largely due to force of circumstance. These initial movements, however, were given momentum by the support of a well organised articulate faction of the ruling class who were frustrated by the restrictions of the existing institutional matrix. This group was eager to plug into the rapidly expanding international financial networks, both to improve their local position and to transcend the obvious limitations of the local economy. Through a number of organisations such as the Business Roundtable they had developed a sophisticated critique of

the post-war economic structure, which was complemented by an equally sophisticated programme of action with which to transcend these structures. Given the intellectual vacuum which had developed during the Muldoon years the force of their arguments carried considerable weight both within the Government and the population at large (or at least many

Table 3.1. Major Economic Liberalisation Measures in New Zealand 1984-1990.

Deregulation of entry licensing in industry	1984+
Partial deregulation of occupational licensing	1985+
Removal of other operating barriers in industry	1984+
Removal of price control	1984-88
Removal of import licensing	1984-88
Significant decrease in import tariffs	1985-92
Revision of town and country planning	1987
Revision of role of producer marketing boards	1987+
Abolition of many quangos and quasi-government organisations	1987
Removal of financial controls (interest rate ceilings, reserve ratio requirements, priorities for various sectors)	1984-86
Removal of foreign exchange controls	1984
Liberalisation of foreign direct investment	1985
Floating of the exchange rate	1985
Revision of corporate, personal and direct taxation	1986-88
Corporatisation of state trading activities	1986+
Programme of sale of state assets	1987+
Review of education and health provision	1988+
Review of competition regulation: Commerce bank Act/ Bank Act/ Securities Act/ Companies Act	1986-89
Deregulation of transportation sector	1983-88
Deregulation of financial services sector	1986
Removal of concessions for favoured investment (e.g. research and development)	1984+
Removal of concessions for favoured sectors (agriculture, export sectors)	1984+
Establishment of Closer Economic Relations with Australia	1983+
Reorganisation of core government departments	1987+
Reform of local government	1989+
Deregulation of ports and waterfront work	1989
Removal of shop trading hours restrictions	1989
Corporatisation of some local authority trading activities	1989
Partial deregulation of shipping	1990
Resource management law reform	1990

(Source: from Savage and Bollard 1990, pp 38).

of the middle classes). These arguments were given further weight by an influential group within the state bureaucracy which had been developing an economic critique which paralleled that of the corporate community, and who were keen to impress this critique on the new government (Jesson 1988b,pp 40-44. 1989, pp 37-43. Wanna 1989, pp 6. Boston 1989, pp 69-79).

These forces, in combination with those individuals within the Labour caucus in favour of deregulation, managed a far reaching policy coup which pushed the Labour Government into a radical restructuring of the New Zealand economy (Jesson 1989).

The essential aim of this restructuring has been the destruction of the post-war institutional matrix, in the belief that by allowing capital to do as it will, the New Zealand economy will move on to a new sustainable growth path. Whether these polices will do so remains to be seen. Certainly the restructuring programme has been wide ranging (see table 3.1). The New Zealand economy has been opened up to the vicissitudes of the global economy. The entanglement of regulations that had structured internal competition during previous decades have largely been dismantled, and state bodies involved in commercial activities have been reorganised as market driven enterprises and in some cases privatised. At the same time macro-economic policy has been reorientated away from aggregate demand management towards the attainment of price stability and fiscal balance (Savage and Bollard 1990. Bollard and Buckle 1987. NZ Planning Council 1989. Endres 1989. Easton 1987a. Britton et al. 1992). Yet, despite six years of restructuring by the Labour Government, followed by two years of vigorous effort by the National Government elected in 1990, the New Zealand economy remains besieged by chronic unemployment, stagnation, and debt.

Still whatever the overall coherence and logic of the restructuring efforts over the past years, it has created a vastly different economic milieu, and the competitive parameters within which the whitegoods industry operates have shifted dramatically.

The Changing Competitive Environment

The most significant single development within the whitegoods industry during the 1980s was the lowering of tariff barriers and the removal of import licensing. Originally the reduction of both were limited to Australian imports under the influence of ANZCERA (otherwise known as CER). This agreement allowed for the progressive removal of both tariffs and import licensing on all whitegoods between 1987 and 1991 (see table 3.2). The impact of this agreement upon the New Zealand market was limited in the early years as most of the import licenses were distributed amongst existing whitegood manufacturers. Hence Fisher and Paykel and McAlpine Industries - which distributed a range of whitegoods made under

contract by Fisher and Paykel - imported some washing machines and refrigerators to supplement their existing lines; a strategy that had been employed in earlier years, but on a smaller scale, under the preceding NAFTA agreement.[3] CER did, however, allow Atlas Appliances, which had in mid-1981 closed its refrigerator and washing machine assembly facilities, to re-enter these markets in 1983 as a distributor of Australian products (Christchurch Press 1983, Sept 14, pp 29. McAlpine Industries 1983).

Table 3.2. Tariff Rates for Whitegoods - 1981-1991

	Dishwashers, Stoves, and Ranges		Washing machines, Clothes Dryers, Refrigerators, and Freezers	
1981	40.0		40.0	
1982	40.0	(22.5)	40.0	(25.0)
1983	40.0	(17.5)	40.0	(20.0)
1984	40.0	(12.5)	40.0	(15.0)
1985	40.0	(10.0)	40.0	(10.0)
1986	38.0	(5.0)	38.0	(5.0)
1987	34.0	(free)	34.0	(free)
1988	28.5	(free)	28.5	(free)
1989	24.5	(free)	24.5	(free)
1990	21.5	(free)	21.5	(free)
1991	19.0	(free)	19.0	(free)

(Figures in Brackets are for goods of qualifying Australian origin).

(Source: New Zealand Customs Department. Personal Correspondence).

The border reduction initiatives within the CER agreement were overtaken by the universal removal of import licensing between 1984 and 1988, and a parallel reduction in tariff rates (see table 3.2).[4] As it happened the direct impact of these shifts was minimal. Certainly in a number of

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3. The NAFTA (New Zealand- Australia Free Trade Agreement) agreement allowed individual exporters of products to the Australian market to arrange to import into New Zealand goods of the type exported (see appendix 2.5 and 2.6) (Lloyd 1987, pp 148).

4. License on demand for Australian sourced Refrigerators, freezers, dishwashers, and stoves started from 1 July 1986. All sources were exempt from July 1 1987. Washing machines and clothes dryers from Australia were exempted from licensing from 1 July 1987, and from all sources in July 1 1988 (Commerce Commission 1989, pp 56. Ministry of Commerce, personal correspondence). It should be noted that an exemption from licensing for Australian commercial clothes washing machines and dryers granted for 1 July 1986 accidently also included domestic equipment. Fisher and Paykel (amongst others) exploited this error to import Hoover washing machines as it was gearing up production of a new range of electronically controlled washing machines. Having satisfactorily established its new machines Fisher and Paykel them successfully applied to have the error corrected (also see latter) (Commerce Commission 1989, pp 56. Sunday Star 1987, May 3).

areas imports of whitegoods from countries other than Australia became significant. Refrigerators from South Korea, and (briefly) Yugoslavia, and Hungary became relatively significant at the lower end of the market (Commerce Commission. 1989. NZ Department of Statistics). And a number of European brands (such as AEG and SMEG) have captured a large part of the cooktop, wall oven, and dishwasher markets (NZ Department of Statistics. Personal Interviews) (see table 3.3. and figures 3.1-3.6).[5] Yet, within much of the whitegoods market competition in the mid and late 1980s continued to rotate predominantly around the actions of a small number of New Zealand and Australian companies.

Table 3.3. New Zealand Imports of Whitegoods - 1982/83 - 1990/1991 (June Years)

	1982-83	1984-85	1986-87	1988-89	1990-1991
Refrigerators*	1876	2233	20349	7121	12232
Freezers - Upright#	27(total)	431(total)	4242(total)	633	1360
Freezers - Chest#				571	998
Dishwashers	3152	4318	12391	12615	12752
Auto Washing Machines#	6061	12306	37217	19252	40426
Tumble Dryers	92	1368	5378	6251	9813

* Includes refrigerators with freezer compartments.
\# Up to 1988/89 chest and upright deep freezers were aggregated.
\# Up until 1988/89 these figure may include a small number of non-automatic machines.
(Source: NZ Department of Statistics).

In fact, within the stove market competition up until the late 1980s continued to be an exclusively New Zealand affair. By the early 1980s range manufacturing was the only product where more than one major local manufacturer remained.[6] At this time three manufacturers - Atlas

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5. Unfortunately the trade statistics - both for imports and exports - for free standing ranges, wall ovens and cooktops are at a relatively high level of product aggregation and hence are off little use. For example up until 1988 bench top ovens (which retailed for around $200) are included within the electric stove (includes both wall and free standing) category. And whilst some anomalies were removed in 1988 it was not until 1990/91 that the categories used can be reliably interpreted (Personal Interviews).

6. This statement should be tempered by the fact that Champion Appliances (ex Radiation Appliances, who were purchased by the New Zealand Company Sanyo Autocrat Holdings Ltd in April 1981) had between 1983 and 1987 been assembling a 2 in 1 front loading automatic washing machine and dryer from knocked-down-kits

Appliances, Champion Appliances, and H.E. Shacklock - were competing for the high volume portions of the range market. Although all three were involved in exporting the local market continued to be the dominant concern for each manufacturer and competition within this market was intense. Due to the introduction of a number of innovative managerial techniques, combined with an extensive investment programme undertaken by the company in both production and design, H. E. Skacklock (which had in 1982 been fully taken over by Fisher and Paykel Industries) managed by the mid 1980s to obtain a dominant position within the market. As a result the other two manufacturers, both of which received substantially less financial support from their controlling companies, were left to fight between themselves for the remainder of the market (Personal Interviews. NZ Herald. Otago Daily Times. Atlas Majestic Industries 1980. 1981. Atlas Corporation 1984. 1985. Ceramco Corporation 1985-1989. Fisher and Paykel 1981-1989. Autocrat Sanyo (NZ) Holdings 1982-1987).

Due to the intense competition the volume producers made few profits during the early 1980s. In contrast a fourth manufacturer, Moffat Appliances, managed to make healthy profits. It did so by using a range of flexible manufacturing technologies to produce a steady 4,000 to 4,500 high quality stoves annually and refusing to discount, avoiding the destructive price cutting which the high volume manufacturers frequently indulged in. Moffat decided to withdraw from the domestic ranges market in the mid 1980s to concentrate upon commercial cooking equipment, a product line it had been developing with much success over the past decade, and production of domestic stoves was wound down during 1988 ceasing in early 1989 (Personal Interviews).[7]

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supplied by an Italian company. Prior to this it had been undertaking fully scale manufacturing of both these products (although the designs for both were based substantially upon English designs supplied by Radiation's English owner). This washer was complimented in 1986 with the introduction of a top loading automatic washing machine and a tumble dryer assembled from kits supplied from Japan by Sanyo (who owned 20 percent of Sanyo Autocrat holdings) . Champion also introduced a dishwasher in 1982 (based upon a design purchased from a Swedish company ASKO, a company which currently exports directly to New Zealand). In both the clothes-care and dishwasher markets the success of the Champion products was limited, and their production was discontinued soon after Champion was sold to Stride Corporation (see also appendices 2.5, 2.6) (Personal Interviews. Consumer. Otago Daily Times 1981, April 14. 1987, November 2. Autocrat Sanyo (NZ) Holdings 1982-1985).

7. According to Moffat's general manager the decision to cease manufacturing domestic stoves was not influenced by the prospect of competition from European manufacturers. And it should be noted that European manufacturers did not be come significant in this market until 1989 (Personal interviews. NZ Department of Statistics)

Whilst Moffat was making a dignified exit from the market, the volume manufacturers continued their battles over market share. For a period a competitive truce (or something akin to that) had prevailed, but the sale of Champion Appliances to Stride Corporation - a private company consisting mostly of Champion Managers - in 1987 led to a period of intense price discounting as Stride attempted to boost its market share. Stride Corporation was in fact unable to sustain this level of competition and was placed in receivership in April of 1988 and its manufacturing plant closed in July 1988.[8] However, although Atlas Appliances survived this competition, poor management, low quality products (Atlas had over the past couple of years replaced many high grade materials with lower quality substitutes in an effort to remain competitive), and dated equipment had placed it in precarious position.[9] Atlas Appliances's collapse was forestalled by the intervention of Email, the largest Australian whitegoods manufacturer, who purchased Atlas in December 1988 (Personal Interviews. Manufacturer 1988, Sept, pp 4. NZ Herald. Otago Daily Times. Atlas Majestic Industries 1980. 1981. Atlas Corporation 1984. 1985. Ceramco Annual Reports 1985-1989. Fisher and Paykel. 1981-1989).

The purchase of Atlas Appliances - in combination with Appliance Marketing Limited (AML) which marketed imported whitegoods and had in 1987 been made independent of Atlas - by Email brought the developments of the range market within the mainstream of events within the rest of the industry. Whilst Atlas, Champion, and Shacklock and been battling between themselves, within the refrigerator and clothes care markets the Australian imports were making gradual gains in the New Zealand market (see table 3.4 and figures 3.1-3.4). Despite this encroachment New Zealand and Australian markets were still treated as discrete entities by both Fisher and Paykel and the Australian manufacturers. No Australian manufacturer had established an independent distribution network within New Zealand. Similarly Fisher and Paykel marketed its products in Australia through Email. However, from 1987 onwards the Australian and New Zealand markets became evermore inextricably intertwined.[10] This reflects not

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8. Upon the closure of Champion Fisher and Paykel purchased the Champion brand name. It has not, however, used it. It also purchased some of Champions machinery (Personal Interviews).

9. Some sense of the cost of this competition can be gauged from the fact that range prices fell by as much as 30 percent, yet total sales for the 1987/88 June year increased by only 8 percent (Manufacturer 1988, Sept, pp 4).

10. It would be misleading, however, to talk about New Zealand and Australia as being a single market as in a number of key areas the two markets are quite different. An

Table 3.4. Market Share by Product Type - Year Ended 30 June 1987

	Fisher and Paykel	White-ware Corp**	A. M. L. and Simpson #	Other	Total Local Supply
Refrigerators	65	5	20 (10)*	10	80
Freezers	70	5	25 (15)	5	85
Washing machines	70 (15)	0-5	20 (15)	10	60
Clothes dryers	80	5	15 (15)	5	85
Dishwashers	75 (20)	5	20 (20)	0-5	60
TOTAL MARKET SHARE##	70	5	20	5	--

* (Figures in brackets refer to the percentage of the total product market that was supplied by imports).
** Whiteware Corporation had distributed a range of Fisher and Paykel whitegoods under the Shacklock brand name since mid 1987. This line was introduced with the aim of giving a presence in non-francised dealers, upon Fisher and Paykel's cancellation of its production agreement with McAlpine (see next footnote and latter discussion). It should be noted that in the following year Whiteware Corporation made significant gains into AML's market share increasing its total market share to 10 percent (Commerce Commission 1989, pp 37. Baker 1988).
# Ceramco (who had merged with Atlas Corporation in September 1985) purchased McAlpine Industries in late 1986. In April 1987 Ceramco merged the appliance distribution arms of both Atlas and McAlpine to form Appliance Marketing Limited (AML). Fisher and Paykel cancelled its contract to make Prestcold products for AML (nee McAlpine) in May 1987 and AML subsequently signed an agreement with Simpson (who since 1986 had been owned by Email) of Australia to manufacture a range of Prestcold products for them. AML (nee Atlas) was already distributing Simpson products under the Simpson brand name (Manufacturer 1987, April 21. Commerce Commission 1989, pp 36. Personal Interviews).
Total sales of these products for the year was 290 000 units.

(Source: NZ Commerce Commission 1989, Appendix 6a).

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interesting example of these differences, and the dilemma they present for manufacturers active in both markets, is in emphasis placed upon energy consumption in each country:

> In New Zealand ... Electrocorp Marketing advertises to encourage power consumption. In Australia the reverse applies, with power authorities advertising electricity conservation.
>
> So if we [that is Fisher and Paykel] build a product that saves energy, perhaps at the same time losing operational efficiency, we satisfy the needs of the Australian standards but provide a less suitable product for our New Zealand and Australian customers (Fisher and Paykel 1991, pp 19)

only the influence of CER but also both Fisher and Paykel's and the Australian manufacturers' increasing confidence.

During the early 1970s Australian manufacturers were generally less competitive than the most efficient New Zealand manufacturers. However, throughout the 1970s and early 1980s, pressured by the lowering of protection barriers, productivity within the industry increased rapidly.[11] Moreover during the 1980s several companies began to explore a number of alternative strategies which redefined the relationships between product runs and the most efficient scales of operation. As a result by the mid 1980s the Australian companies were looking with interest at expanding internationally rather than merely surviving within the Australian market (Rich 1987, pp 117-121. ABIB 1982, pp 33-56. NZ Herald 198, June 8. Shoebridge 1990. Simpson 1980-84. Email 1984-1990).[12]

The first Australian manufacturer to establish an independent New Zealand distribution network was Hoover (Australia). Hoover had for many years distributed its products - washing machines and clothes dryers - through Fisher and Paykel. By early 1987 Hoover had become disaffected by this arrangement. This disaffection was based upon the recognition that Fisher and Paykel's own range of automatic washing machines was getting increasingly competitive, and that Fisher and Paykel would not promote Hoover's products at the expense of its own. Moreover, the purchase of a Philips (Australia) refrigeration plant in May 1987 had moved Hoover into the refrigerator/freezer market, an area in which Fisher and Paykel was unlikely to proffer much support. Hence Hoover established a New Zealand subsidiary, cancelled its agreement with Fisher and Paykel, and in early 1988 started to distribute its products in New Zealand (Sunday Star 1987, May 3. NZ Herald 1987, May 13. November 10. Commerce Commission 1989, pp 35-37).

Hoover's actions were followed by Email with its purchase of Atlas Appliances and AML, to form Simpson Appliances (NZ). Prior to 1988 Email had indirectly had a significant presence in the New Zealand market through AML (and its forebearers see footnote to table 3.4). Hence by

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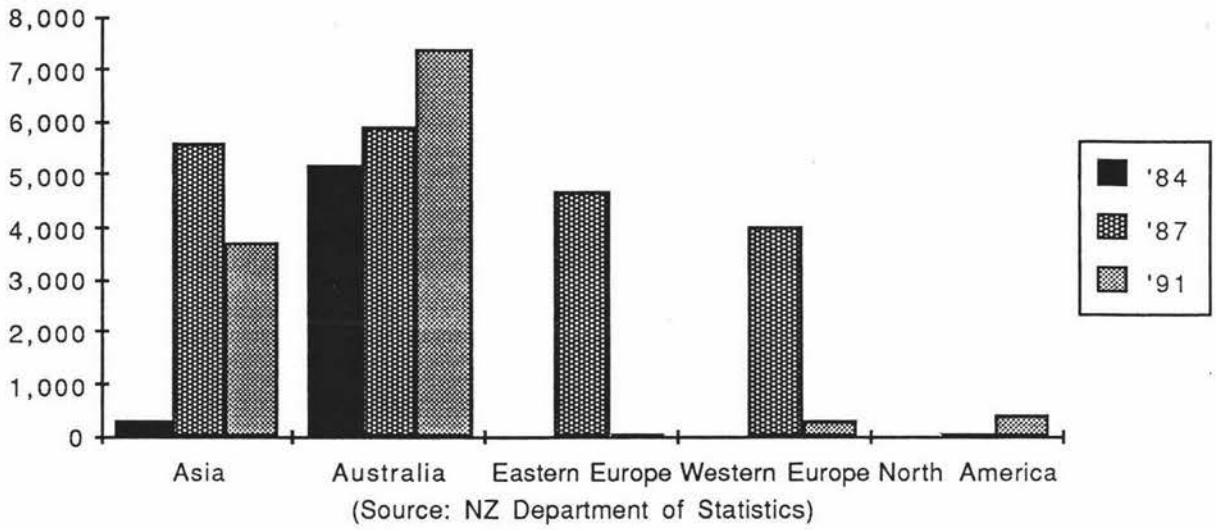
11. Where in 1972 there were 27 manufacturers of whitegoods in Australia, by 1986 there were only 7. Moreover, four of these companies - Email/Simpson, Hoover, Philips, Rheem/Vulcan - accounted for around 95 percent of the total market (Rich 1987, pp 122-123).

12. The American whitegoods manufacturer White Consolidated (which is owned by the Swedish company Elextrolux) owns 18 percent of Email, and is keen to use Email's product facilities as part of its push into the rapidly expandind Asian market (Shoebridge 1990).

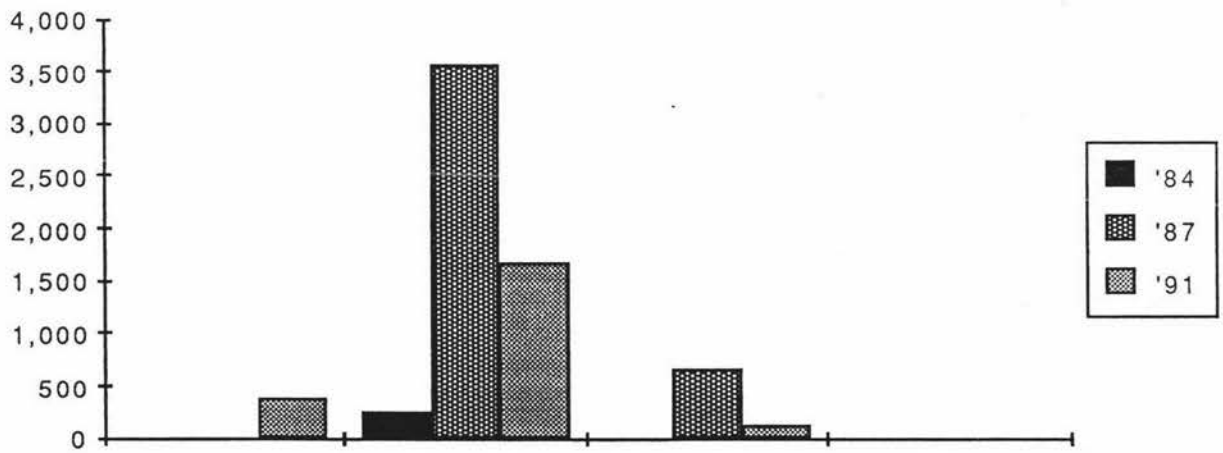
Figures 3.1 and 3.2.

New Zealand Refrigerator Imports 1983/84, 1986/87, and 1990/1991 (June Years)



(Source: NZ Department of Statistics)

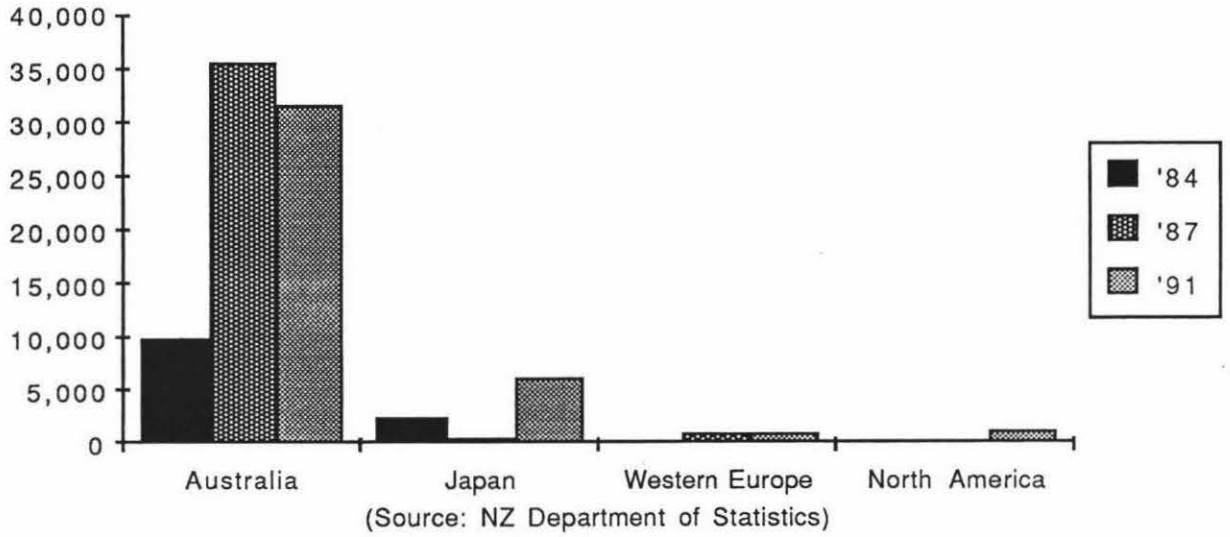
New Zealand Freezer Imports 1983/84, 1986/87, and 1990/91 - Individual Units (June Years)



(Source: NZ Department of Statistics)

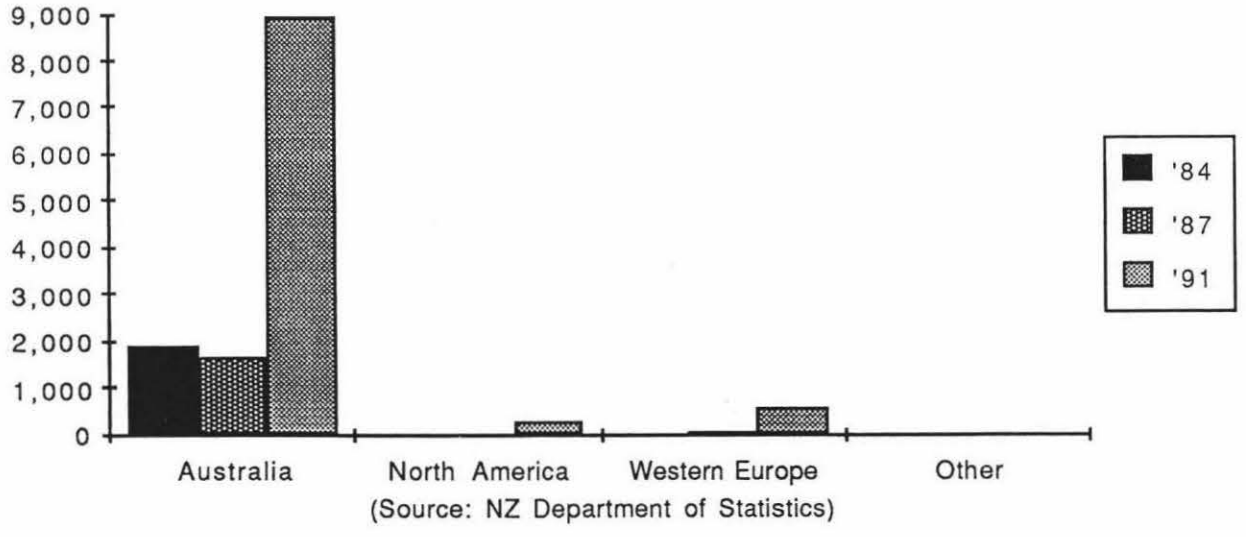
Figures 3.3 and 3.4.

New Zealand Automatic Washing Machines Imports, 1983/84, 1986/87, and 1990/1991 - (June Years)



(Source: NZ Department of Statistics)

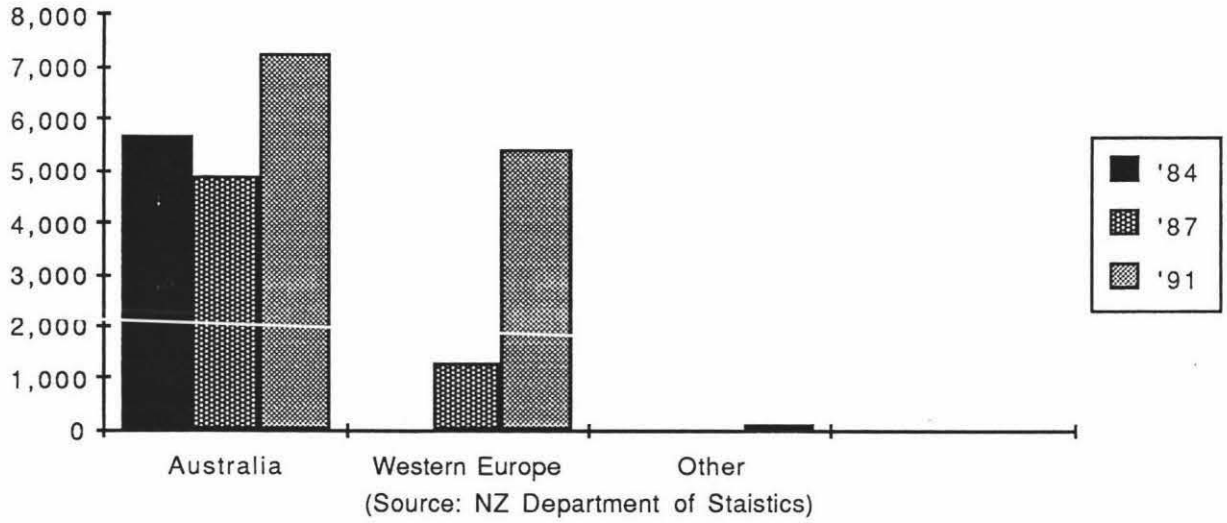
New Zealand Tumble Clothes Dryer Imports, 1983/84, 1986/87, and 1990/1991 - Individual Units (June Years)



(Source: NZ Department of Statistics)

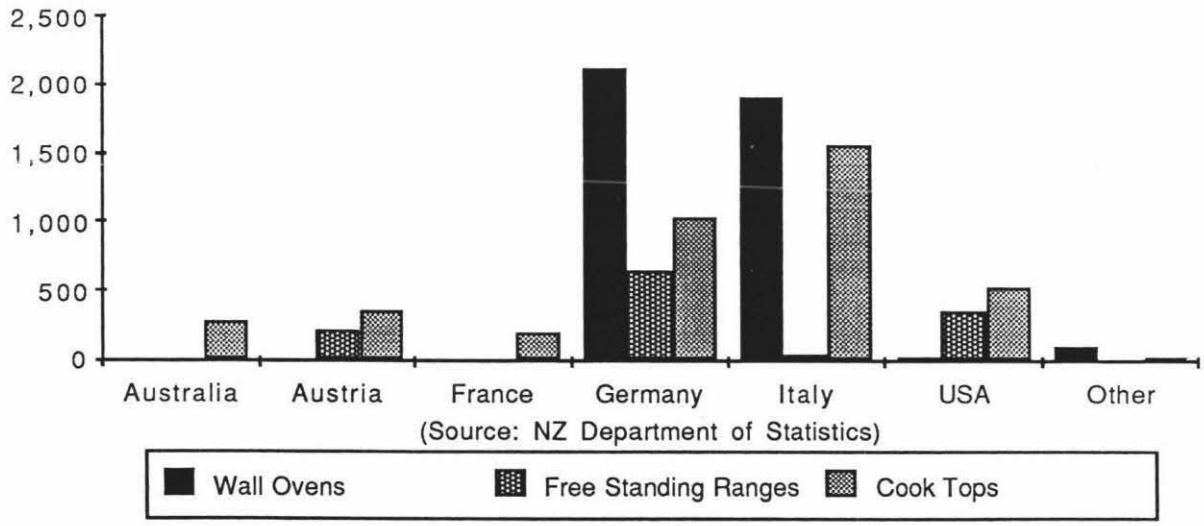
Figures 3.5 and 3.6.

New Zealand Dishwashing Machine Imports 1983/84, 1987/88, and 1990/1991 - individual Units (June Years)



(Source: NZ Department of Staistics)

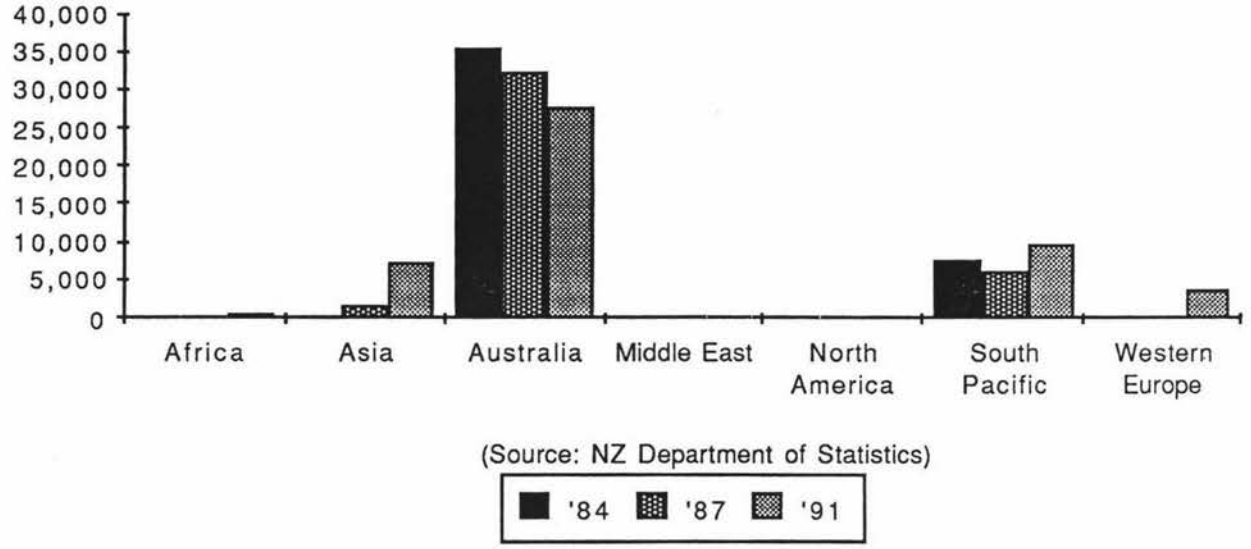
New Zealand Range and Cook Top Imports 1990/91 - Individual Units (June Year)



(Source: NZ Department of Statistics)

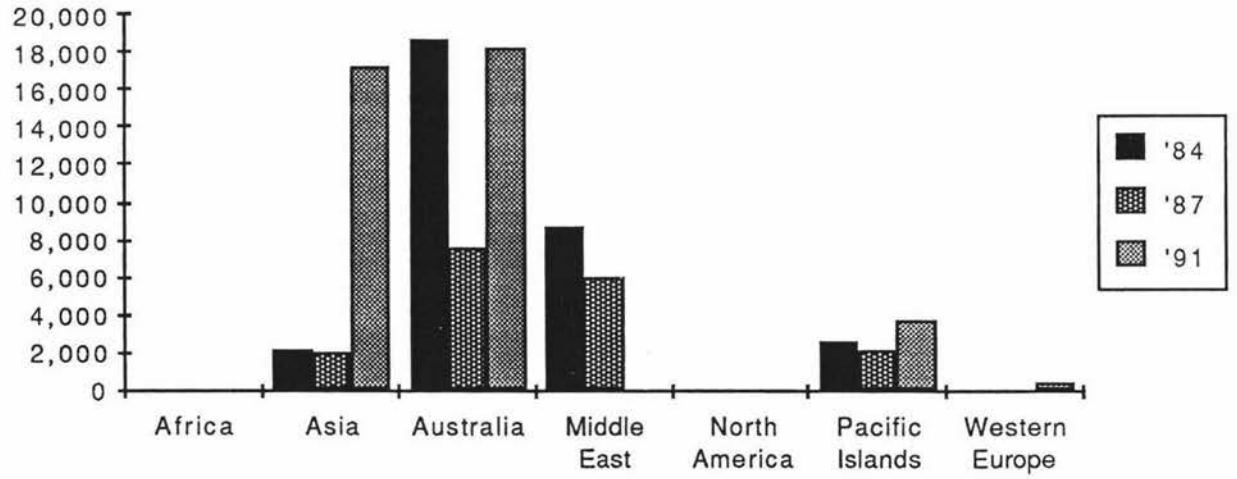
Figures 3.7 and 3.8.

New Zealand Refrigeration Exports 1983/84, 1986/87 and 1990/91 - Individual Units (June Years)



(Source: NZ Department of Statistics)

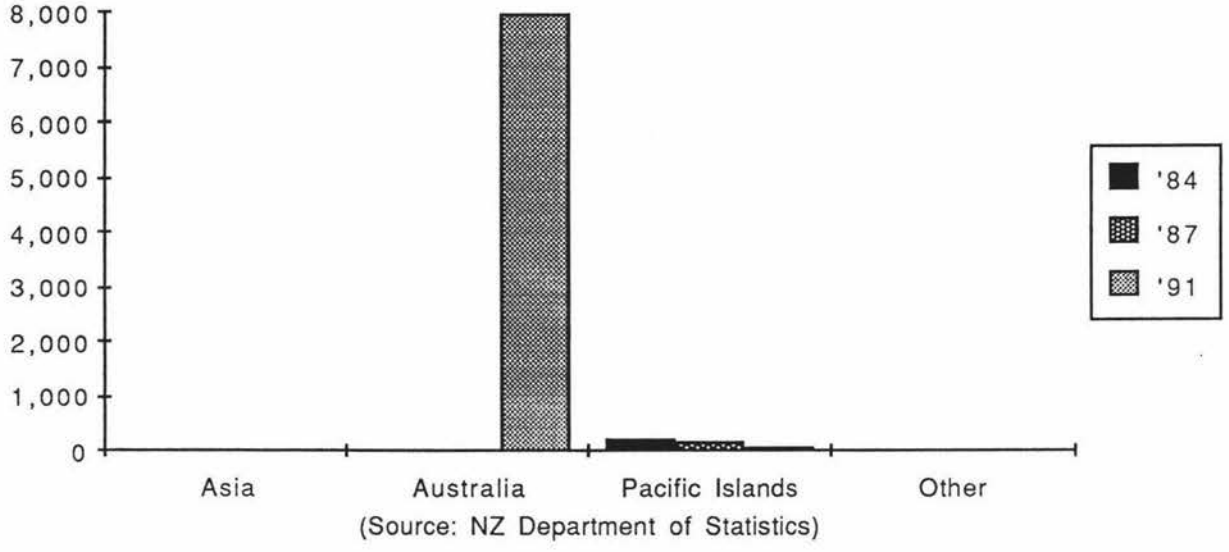
New Zealand Deep Freezer Exports 1983/84, 1986/87, and 1990/91 - Individual Units (June years)



(Source: NZ Department of Statistics)

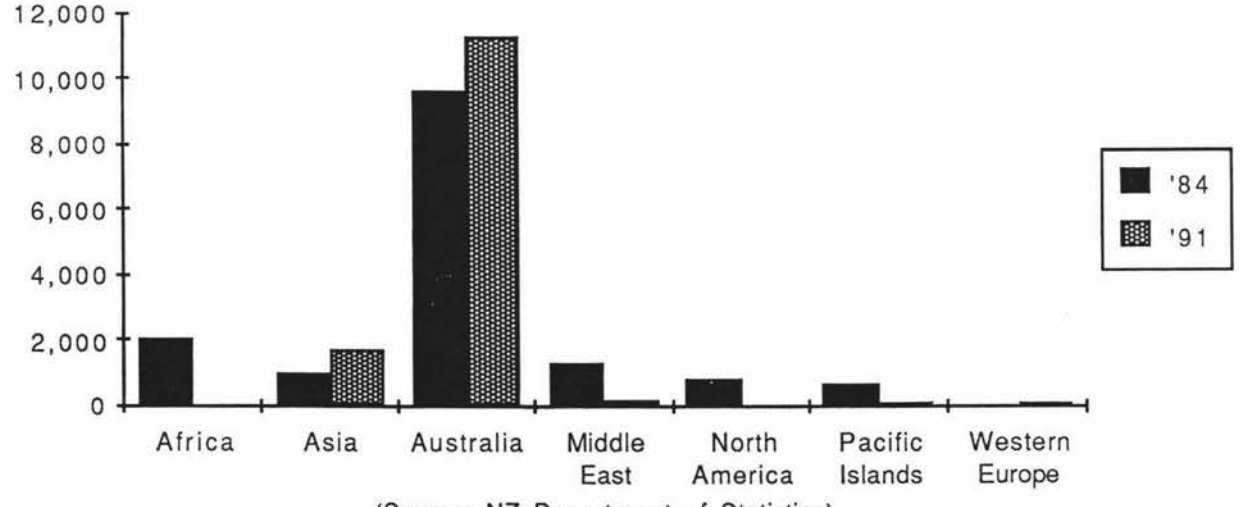
Figures 3.9 and 3.10.

New Zealand Automatic Washing Machine Exports 1983/84, 1986/87, and 1990/91 - Individual Units (June Years)



(Source: NZ Department of Statistics)

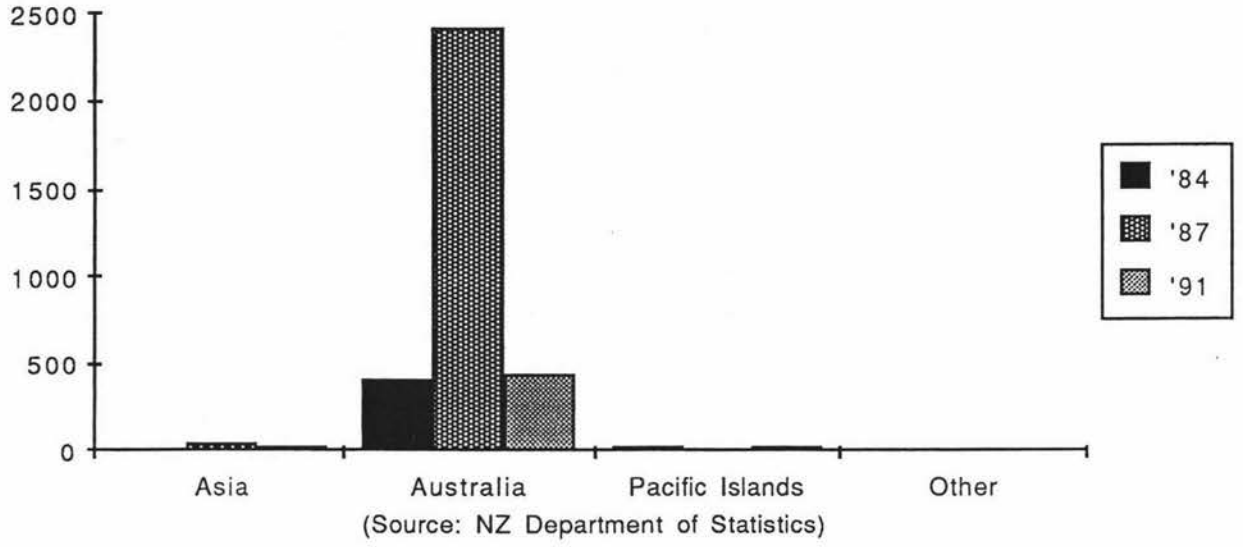
New Zealand Tumble Dryer Exports 1983/84, and 1990/91 - Individual Units (June Years)



(Source: NZ Department of Statistics)

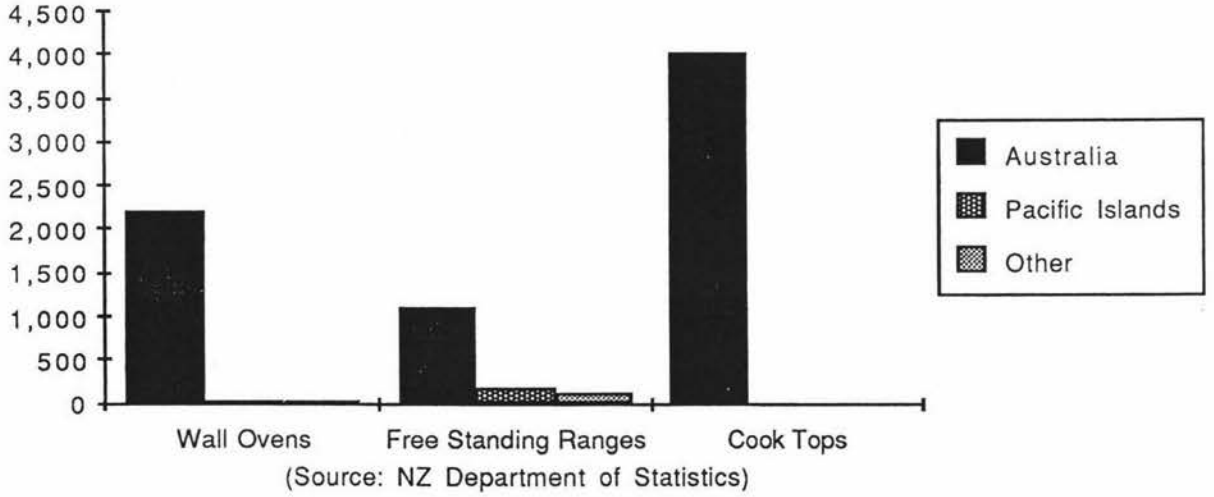
Figures 3.11-3.12.

New Zealand Dishwashing Machine Exports 1983/84, 1986/87, and 1990/1991 - Individual Units (June Years)



(Source: NZ Department of Statistics)

New Zealand Range and Cook Top Exports 1990/91 - Individual Units (June Year)



(Source: NZ Department of Statistics)

purchasing Atlas/AML Email gained control over an already well established distribution network, as well as a significant portion of the New Zealand stove-cooktop market, an area where it had not previously been represented. Since purchasing Atlas/AML Email has been eager to expand its presence in New Zealand. In part its strategy to do so has involved aggressive marketing and pricing strategies. More unconventionally it challenged the legality of Fisher and Paykel's exclusive dealership system which was central to Fisher and Paykel's dominance of the New Zealand refrigerator/freezer, clothes care, and dishwasher markets (NZ Herald. National Business Review).

In the 1950s and 1960s it was common practice in New Zealand for whitegood distributors to insist that their dealers only stock their range of whitegoods - that is to have exclusive dealerships (Sewell 1965, pp 85). Through the years, as Fisher and Paykel expanded, it managed via exclusive dealerships to lock a large number of high calibre whiteware retailers into its distribution system. This exclusive distribution network provided Fisher and Paykel with a significant advantage vis-a-vis prospective competitors as it effectively excluded such competitors from the largest, highest profile whitegood retailers (Commerce Commission 1989, pp 41. 50-57). Now whilst Australian importers had made some market gains during the mid 1980s, by 1988 their markets had reached a stage where further gains would require attacking Fisher and Paykel dealers head on. Such an assault would be very costly. However, AML - and its later manifestation Simpson (NZ) - with the support of Email attempted to sidestep these costs by challenging the legality of the exclusive dealership system, with the aim of forcing Fisher and Paykel dealers into stocking a full range of brands. This led to a Commerce Commission hearing where Fisher and Paykel sought, but was not granted, approval for its dealership system. Simpson (NZ) (nee-AML) responded to the commission's decision by seeking a high court declaration that the exclusive dealerships contravened the Commerce Act.[13] The subsequent court case - which cost over $2 million - upheld the legality of Fisher and Paykel's dealer system, leaving Simpson back where it started (Auckland Star. Evening Post. NZ Herald. Sunday Star. Commerce Commission. 1989. Fisher and Paykel 1989, pp 12. 1990, pp 10. Personal Interviews).

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13. For those with a pedantic streak prior to going to court Fisher and Paykel appealed the commission decision in the High Court and lost (Fisher and Paykel 1989, pp 12).

The vigour with which Email has pursued Fisher and Paykel suggests that there was more behind Email's moves than a simple desire to succeed within the New Zealand market. In fact Email's aggression within the New Zealand market was largely defensive. At the same time that both Hoover and Email were securing direct distribution and production facilities in New Zealand, Fisher and Paykel was broadening its presence within Australia. This posed a direct threat to the Australian manufacturers. Hence to counter it Email has been attacking Fisher and Paykel within New Zealand in the hope of undermining Fisher and Paykel's Australian ambitions. Indeed, in an obvious attempt to mute Fisher and Paykel, Email unsuccessfully attempted in early 1989 to purchase a controlling share of Fisher and Paykel (NZ Herald. National Business Review). That Fisher and Paykel was capable of posing a threat reflects the success of a development strategy which the company had been evolving over past couple decades.

Table 3.5. New Zealand Exports of Whitegoods - 1982/83 - 1990/1991 (June Years)

	1982-83	1984-85	1986-87	1988-89	1990-1991
Refrigerators*	24053	38720	40034	47370	49097
Freezers - Upright	2281	4059	4896	5492	6215
Freezers - Chest	32818	21005	13134	26038	34200
Dishwashers	3236	332	2465	1731	486
Auto Washing Machines#	273	443	174	1790	8098
Tumble Dryers	4694	8937	(DNA)**	8920	13439

* Includes refrigerators with freezer compartment.
** Data not available.
# Up until 1988/89 these figures may include a small number of non-automatic machines.
(Source: NZ Department of Statistics).

In the mid 1960s Fisher and Paykel had recognised the limitations of concentrating solely upon the New Zealand market. It also recognised that in the long term the local market was going to be much more porous than it was during the 1960s. Hence since this time Fisher and Paykel has been pursuing a strategy which involved using its domination of the local market as a springboard into foreign markets, recognising that in so doing it would be in position to defend its local dominance when (and if) frontier barriers were removed. During the late 1960s and 1970s the company

restricted itself to consolidating its local position and exporting to Australian and Pacific Island markets (see pages 46-47). The late 1970s and early 1980s saw an intensification of the company's international expansion with the development of a range of new markets most notably in the Middle East (see figure 3.8).[14] Yet the domestic market continued to be the primary focus of the company's activities (Fisher and Paykel 1981-1987. NZ Herald. Watson 1976. Manufacturer 1981. February 23, pp 8. Personal Interviews).

The advent of CER and the lowering of frontier protection combined with the company's increasing confidence that it could successfully compete in international markets has, however, led to shift in the company's strategy in the mid 1980s which has diluted the importance of the New Zealand market. This strategy has four dimensions:

(1) *Continued dominance of the New Zealand market.* Fisher and Paykel has dominated the New Zealand whitegoods market for many years and so it is unremarkable that the company wishes to retain this position. Still it is important to remember that while the overall

Table 3.6. Overseas Whitegoods Sales and Royalties Revenue as a Percentage of Fisher and Paykel's Total Whitegoods Revenue.- March Years.[15]

1983	1984	1985	1986	1987	1988	1989	1990
21.4	23.7	17.8	13.4	24.0	21.3	23.4	30.2

(Fisher and Paykel 1984-1991).

significance of the New Zealand market is declining (see table 3.6), New Zealand remains the company's largest market. Indeed whilst between 1986 and 1990 exports receipts more than doubled, recession conditions in New Zealand (coupled with - and in part caused by - high interest rates), combined with the removal of import licensing

14. The collapse of freezer sales to the Middle East in 1990/91 in figure 3.8 was due to overstocking by Fisher and Paykel's middle East distributor in earlier years, as well as the economic uncertainty within the region during this period. Fisher and Paykel hope to resume exporting to the Middle East when these problems are resolved (Personal Interviews. Fisher and Paykel 1991).

15. The decline in the proportion of overseas revenue vis-a-vis domestic revenue during 1985 and 1986 was largely due to the high value of the New Zealand dollar during these years, which was a direct result of the high interest monetary policy being pursued by the Government and Reserve Bank (Whitwell 1987. Planning Council 1989, pp 63-64).

significantly reduced Fisher and Paykel's overall profitability during this period (Fisher and Paykel 1987-1991).

(2) *The Development of new markets.* This is essentially an extension of the strategy that - as was mentioned above - Fisher and Paykel had been pursuing since the late 1970s. This search for new markets has seen the development of markets in Asia (most notably for chest freezers in Japan) and Western Europe (see figures 3.7-3.8). Whilst the company has been developing these markets on a long-term basis, it also supplies a large number of smaller markets on a more casual basis (Fisher and Paykel 1981-1991. NZ Herald. National Business Review. Personal interviews).

(3) *Widening the range of products exported.* Although Fisher and Paykel exports all its product groups, up until the late 1980s the company's international expansion has been restricted mainly to refrigerators and freezers (see figures 3.7-3.12).[16] The push to expand its range of exports has been accompanied by an intensive programme to develop new and innovative products. This development programme entails a significant long term investment, and the achievement of a satisfactory return is dependent upon the success of these goods in international markets (Fisher and Paykel 1981-1991. Evening Post. NZ Herald. National Business Review. Personal interviews).

(4) *Developing a comprehensive and long term presence within the Australian market.* This involves developing the Australian market such that the volume of Australian sales comes to equal if not exceed the company's sales within New Zealand. The logic behind this strategy is two fold. Firstly, for those products that Fisher and Paykel does not export in large volumes the Australian market provides a useful platform from which to develop further markets. Secondly, and perhaps more importantly given what has been said above, the establishment of a substantial presence in Australia gives Fisher and Paykel another stable high volume market to compliment its New Zealand base. This would not only lessen the company's dependence upon the New Zealand market, but also substantially increase the volume of product in core markets which can be relied upon to validate investment in manufacturing facilities and product

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16. Although for a period in the 1970s it also exported large numbers of tumble dryers to Australia (see pages 46-47).

development (Fisher and Paykel 1981-1991. NZ Herald. National Business Review. Australian 1992, May 5. Personal interviews).

It is the fourth part of Fisher and Paykel's strategy that has caused Email so much concern. Fisher and Paykel - which had for many years distributed its products through Email - began establishing an independent Australian distribution network in late 1987. Moreover, in a move that underlined the importance of Australia to Fisher and Paykel, the company decided in July 1988 to build a refrigerator plant in Australia (at Cleveland just out of Brisbane). Given the freedom of movement of both capital and products under CER, the elevated importance of the Australian market, the establishment incentives offered by both federal and state governments, and Fisher and Paykel's need to extend its refrigerator production capacity, this was an unsurprising move (NZ Herald. Fisher and Paykel 1988-90. Personal interviews).[17] Still, for a company that had previously restricted its manufacturing activities exclusively to New Zealand the decision to commence manufacturing in Australia represents a major innovation.

The discussion so far has, however, only told half the story behind Fisher and Paykel's international expansion. Whilst Fisher and Paykel is clearly capable of effectively competing in Australia and the rest of the world it remains, by international standards, a relatively small company.[18] In an industry where scale economies are paramount this is a noteworthy achievement (ABIB 1983, pp 6-8). Which raises the question of how has the company managed transcend the limitations of its small size.

A New Production Paradigm - Single Batch Mass Production

When in the mid 1960s Fisher and Paykel recognised the restrictions which continued dependence upon the New Zealand market would impose on it, the company also realised that due to its size it could not compete internationally without radically altering the fordist production systems

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17. The exact incentives that were offered, and their total value is confidential. However, the Queensland (the state where Fisher and Paykel eventually decided to build its new factory) Minister for Business, Industry and Regional Development announced in a press statement of July 19 1991 incentive packages totaling almost $2 million for three ventures one of which was Fisher and Paykel's factory. The incentives 'have all been claimed in the form of concessions on government charges such as pay-roll tax, stamp duties, electricity tariffs, crown land rental and assistance with reallocation expenses.' (The author would like to thank Derek Kemp and Kate Rose for information on incentives offered).

18. Email's whitegoods turn over, for example, is around twice that of Fisher and Paykel (Email 1991. Fisher and Paykel 1991).

which it was then using. The reason for this was simple. Central to the fordist paradigm was the use of highly dedicated automated machinery. Automated machinery - if accompanied by a high volume of throughput - provided substantial savings in labour and capital costs per unit compared with their manually controlled counterparts (Altshuler et al. 1984, pp 135-135. Hounshell 1984, pp 288. Sewell 1965, pp 107). Up until the mid 1960s, however, it was not possible to quickly alter the operational parameters of such machines, they were, as Braverman (1974, pp 189) points out, not so much automated as predetermined. Given the small size of Fisher and Paykel's production runs the use of such highly dedicated machinery for each model was uneconomic (Williams 1979. Personal interviews).

Fisher and Paykel's initial attempts to overcome this limitation focussed upon the manufacture of refrigerators and freezers. Fisher and Paykel sought to design an automated refrigerator/freezer steel forming line that was capable of producing a wide range of refrigerators and freezers with little change over time from one model to the next.[19] [20] Such a line would - if the company could develop the control mechanisms to make it work - allow Fisher and Paykel to spread the cost of the line over the company's whole product range, hence allowing it to obtain by de-facto the sorts of scale economies larger companies were obtaining (Personal interviews).

There were initially two dimensions to the company's efforts to develop a programmable steel forming line. The first involved the development of product families based around common components. Up until this time products which were seemingly very similar often had few parts in common, for example in the early 1960s Fisher and Paykel was making three sizes of chest freezers which 'had almost nothing in common and were not even the same height' (Williams 1979). Designing products on a modular basis reduced the variations needed to switch from the production of one model to the next.[21] Take as an example the production of

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19. The principle components involved here are the outer wrapper of the refrigerator or freezer, the freezer tank (for dual temperature refrigerators and freezers), the door(s) panel(es), and the back or end panel.

20. The author recognises that the concept of automation is a somewhat abused term with little conceptual definition. It is, however, a useful shorthand for processes which require very little direct human intervention to allow them to function (Blackburn et al. 1985, pp 21).

21. It should be noted that the movement towards product families designed upon a modular basis was not unique to Fisher and Paykel. Many other companies throughout North America, Japan, and Europe were at this time moving towards more modular designs. However, for the North American and European companies at least, the use of

the outer shell for a family of refrigerators. By designing each refrigerator to a common width and depth only the height of the wrapping, backpanel, and door need be varied when manufacturing shells for this range of refrigerators. Which leads to the second part of Fisher and Paykel's plan, the design of steel forming machinery whose operational parameters could be quickly and easily altered. Fisher and Paykel successfully developed an electronically controlled, variable width, roll former which they had built in New Zealand. This was combined with programmable notching (needed to allow the formed sheet to be folded) and folding machinery. By the early 1970s this line was capable of changing from one model to another in 30 seconds. Hence rather than producing a batch of several hundred of a single model, the company was able to produce a mix of two or three models in batches of three or four over a few days then switch to different set of models. Through use of this system Fisher and Paykel managed to drastically reduce the person hours needed to produce a refrigerator or freezer. Whilst in 1962 the production of a chest freezer took 25 person hours, by 1975 the number of person hours needed had been reduced to five (Personal interviews. Williams 1979). Moreover, by reducing the size of product batch sizes, the system also reduced both the level of work in progress and completed goods inventory (Personal interviews).

These successes encouraged Fisher and Paykel to further explore the possibilities of mass production based around producing a wide range of products on a single, highly automated line. At the same time the introduction of programmable machinery also suggested the possibility of introducing a range of other technological and organisational innovations. These innovations have substantially increased the operational efficiency of Fisher and Paykel's manufacturing systems. What-is-more by removing many of the rigidities of the company's earlier manufacturing systems they have also allowed the company to explore a range of marketing strategies not previously possible. Given the depth of the transformations that have occurred over the past couple of decades it is useful to see this period as constituting a shift in the company's technological paradigm.

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modular designs was seen as an way to allow greater economies of scale in the production of sub-components and as such they did not represent a major shift in the overall organisation of the production systems in place (Blackburn et al. 1986, pp 92). In contrast, as the following discussion will show, whilst Fisher and Paykel's move towards modular product families was motivated by the desire to achieve greater economies of scale the introduction of modular components also helped facilitate a major shift in the company's production systems.

Describing Fisher and Paykel's new technological paradigm and how it differs from the preceding fordist paradigm is difficult, however, as the trajectory Fisher and Paykel is moving along has strong antecedents within the fordist paradigm. Indeed, in an important sense the paradigm within which the company is operating can be seen as an extension of fordism; standardised components, dedicated machinery, and flow line production, are central to single batch mass production just as they were (are) to fordist systems. Yet the articulation of these principles within Fisher and Paykel's current manufacturing systems are very different than within traditional fordist systems. At the heart of these differences is the emphasis placed upon, and systems used to achieve, a continuous production flow.

As has already been stressed, the ideal of a smooth and continuous flow of material through a factory was a central feature of the fordist paradigm. Yet in reality there was an enormous divergence between this ideal and the actual systems in place on the shop-floor. Chapter two has already illustrated how the achievement of this ideal was undermined within the New Zealand whitegoods industry by the small size of individual production runs, but even the largest North American and European manufacturers - whether they were producing automobiles or whitegoods - rarely, if ever, managed to attain a smooth, uninterrupted flow of material through the shop-floor. The reasons for this divergence between basic principles and actual practice were simple. The production of any complex product will involve a wide range of dissimilar processes. Each process will, most likely, have very different through put times varying from a few seconds to many hours. Coordinating each process so that the right component arrives at the right place at the right time presents an extremely complex logistic problem. Moreover, unless each process was carried out by completely dedicated machinery, which was rarely the case, the operational parameters of the machinery being used would frequently need to be reset. This creates a further degree of complexity as the ideal run size will vary considerably from process to process depending upon such factors as the level of sophistication of the control mechanisms of the machines used in a process, the complexity of the process and so forth. In fact the the breaks between processes, and the holding of inventory to bridge them, were an integral part of the fordist production systems. Such breaks had the effect of isolating production problems within any given process to that process (Sayer 1986a, pp 47-49. Altshuler et al. 1984, pp 39.

Cusumano 1985, pp 264). Thus the attainment of a continuous flow was seen in terms of a trade off between the economies of scale possible with near constant machine utilisation, the need to hedge against uncertainty, and the advantages offered by a more rapid turn over time that came from continuous flow production.

This trade off is still of importance to Fisher and Paykel, however the defining parameters are very different from those within the traditional fordist paradigm. Hence rather than accepting the need for large stocks of work in progress Fisher and Paykel stresses the importance of reducing such inventories to as close to zero as possible. There are two basic motivations behind this:

(1) Financially the costs of holding large stocks of both work in progress and final product have increased greatly over the past couple of decades as at various times inflation and/or real interest rates have reached high levels (Planning Council 1989. Personal interviews). In fact prior to this period the true costs of holding high levels of inventory were never adequately quantified. Long lead times, long product runs, and high levels of inventory were seen as fundamental to the fordist system and hence little effort was put into reducing such levels. That all three could be reduced with little effect on machine utilisation, and that such reductions could dramatically reduce the amount of capital tied up within a factory, had been strikingly demonstrated by Japanese manufacturers during the 1950s and 1960s (Cusumano 1985. Sayer 1986a).

(2) Whilst during the 1950s and 1960s the New Zealand economy was defined by its stability and predictability, over the past decade or so the economic environment has become markedly more volatile (NZ Department of Statistics. NZ PLanning Council 1989). This volatility is reflected in Fisher and Paykel's domestic sales over recent years (see table 3.6). Within such an environment the ability to adjust rapidly to changing market conditions are paramount. Moreover, Fisher and Paykel's ability to export successfully is crucially dependent upon the flexibility of its production system. For the company to supply a wide range of diverse markets it must be capable of rapidly altering its production schedules to accommodate incoming orders from these markets. It must also be able to make any necessary modifications to its basic product range to meet the differing needs of these countries. This does not - generally at least - mean the company must

be capable of spontaneously introducing completely new products. But it does require varying the functional parameters of its products so that they are suitable to the needs of consumers with lifestyles which are frequently very different from those found within New Zealand (Personal interviews. Fisher and Paykel 1981-1991).

Table 3.7. Annual Percentage Change in Fisher and Paykel's Total New Zealand Whitegood Sales by Value - years ended March 31.[22]

1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
5.9	-12.0	20.5	-23.5	-0.5	16.3	-13.0

(Sources: Fisher and Paykel 1981-1991. NZ Department of Statistics).

These demands for flexibility simply cannot be accommodated by production systems rotating around long production runs - such as fordist systems. The long lead times associated with long production runs frequently mean that products must be produced several months before eventual sale. As a result if a large unanticipated downswing in demand for a product or a range of products occurs companies find themselves with large quantities of unsaleable goods. Alternatively during unanticipated upswings in demand long lead times restrict the ability of the system to respond rapidly to the increased demand for their product (Schoenberger 1988, pp 250-251. Dunford 1990, pp 316).

Reflecting these imperatives, Fisher and Paykel has developed manufacturing systems which produce a wide range of models each day and are able, if necessary, to produce every model every day (see plate 3.6). This manufacturing system - which can usefully be labelled single batch mass production (or SBP) - is essentially an extension of the production techniques pioneered on the original programmable steel former line. Yet, whilst the original steel former line was combined with machines - such as injection moulding machines - which were producing components in long runs, within Fisher and Paykel's current manufacturing systems all

22. It should be noted that total revenue figures do not collerate exactly with total per unit sales as the wholesale price of products will - generally at least - fall, in real terms if not in absolute terms, during a recession. Moreover, the long term trend is for the real price of whitegoods to fall vis-a-vis the price of all other consumer items (see Sunday Star 1987, Oct 9, pp D/1).

Table 3.8. Fordist Mass Production Verses Single Batch Mass Production.

Fordist Mass production	Single Batch Mass Production
1. Technology	
• dedicated specialist machinery	•flexible micro-electronically controlled machinery
• large scale scrapping of fixed capital with each model change	•reprogammable machines
•need for long production runs of each model to achieve full economies	•Spreading scale economies over a number of individual models
2. Work Organisation	
•deep division of labour	•weakening division of labour, although still significant
•single unskilled repetitive tasks, supported by skilled staff	•multi-skilling
•rigid division of labour within the plant	•fluidity of division of labour
•hierarchical management structures	•flattening of management hierarchies
3. Quality Control	
•end of process inspections by quality control supervisors	•inspections during process by workers
•slow information feedback about quality problems	•rapid/instantaneous feedback on quality control problems
•removal of faulty material at end of process	•building quality into the process, use of autonomation devices
4. Inventory	
•'just in case' push inventory system	•'just-in-time' pull inventory system
•large buffer stocks and inventories of work in progress	•small to non-existent buffer stocks, work in progress inventories tending towards zero
5. Relationship with suppliers	
•distant relationship	•close, cooperative relationship
•multiple sourcing of many components	•single sourcing of components

(Sources: see text).

components are produced when, and only when, they are needed (see table. 3.8) (Personal interviews).

In part this ability to produce and assemble components on a 'just-in-time' basis has relied upon the development of networks of sophisticated micro-electronically controlled programmable machinery. Given the importance of the advances in micro-electronics which have occurred over the past couple of decades to the development of Fisher and Paykel's manufacturing systems it is helpful to explore in a little detail just why micro-electronics are of such significance.

As has already been stressed the automated machinery in use in American and European factories throughout the 1950s and 1960s was very rigid. This rigidity reflected the inability of the (electro-)mechanical control devices used in such machines to interpret and respond to a wide range of stimuli. The potential to transcend the limitations of these control mechanisms had been suggested by the development of electronic sensing and information processing devices during the 1940s and 1950s. Still, it was not until the late 1960s that the size and cost of electronic componentry had been reduced to a level which made it economically feasible to incorporate electronic control systems into machinery (Freeman et al. 1982, pp 107-122).

Whilst the sorts of machinery that became possible with the development of micro-electronics represented a major advance such machines were still relatively simple. Their capacity to monitor the processes they controlled was tightly constrained by the crudeness of their circuitry, and they were incapable of communicating with other machines except via expensive centralised computers. Hence it was not until the advent of micro-processors in the early 1970s that the potential of micro-electronic control mechanisms became truly revolutionary (Freeman et al. 1982, pp 110-115. 119). Micro-processors both vastly increased the complexity of regulatory functions that electronics could undertake, whilst at the same time opening up the possibility of making machinery capable of communicating with, and responding to, other electronically controlled machines. Thus it became possible to create integrated self-regulating networks of machines capable of coordinating the production a range of components (Blackburn et al. 1985, pp 110-144). And this is what Fisher and Paykel have done.

Take for example Fisher and Paykel's current refrigerator manufacturing system. The production of a refrigerator starts with a

personal computer - which has the factory's production schedule for the day - instructing the wrapper line what type of wrapper it should begin making. This tells the robotic arm linked to the wrapper line which size of sheets of pre-painted steel it should feed into the wrapper line. At the same time (if the refrigerator being produced is a dual temperature model) the tank forming line is instructed to produce a freezer tank to match the refrigerator wrapper, as is the machine that forms the base panel. Hence as the refrigerator wrapper moves down the assembly line it is met by its tank and base panel at the exact moment when these components are needed for assembly (see plates 3.1-3.3) (Personal interviews).

Once assembled the refrigerator carcass is transported by conveyor belt to the foaming department where it is automatically sorted and queued for foaming. As the curing time - that is the time needed before the insulating foam injected into the carcass has set - varies with the size of refrigerator, the order with which the refrigerators emerge from being foamed is shuffled. Thus as a refrigerator rejoins the main assembly line a bar code (which had been placed on the wrapper at the beginning of the line) is read, informing the line computer network that this refrigerator is coming down the line. This information is relayed to a number of sub-assembly lines, which begin to assemble the necessary components for this refrigerator. This is organised in such a way that the component is completed just as the refrigerator reaches the point where the sub-assembly line meets the main line (see plate 3.5). Finally the shelving and bins are then added, and the refrigerator is packaged and moved into the transport bay (Personal interviews).

All this is very neat and tidy. There are, however, a range of other components, whose process time are substantially longer than that taken to form the outer wrapper and to assemble it to such a point where these components are needed. Furthermore, there are also processes where it is still necessary to produce components in lot sizes of greater than one. Steel pressing and injection moulding equipment, for example, must both have their tooling manually changed if they are to be switched from producing one component to another.[23] Whilst Fisher and Paykel have managed to

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23. It is possible to obtain pressing and injection moulding machinery which is capable automatically producing a range of different components. Indeed Fisher and Paykel uses a numerically controlled press in its range and dishwasher factory which produces the two different hob sizes the company needs for its free-standing ranges. Generally, however, the difficulty of programming for three dimensions (as opposed to two for the steel forming line) is such that machinery capable accommodating these

reduce the time taken to execute these change overs, the time taken still prohibits producing components in single units.[24] Integrating the production of components produced by such processes with those with short process times networked with other machinery, whilst ensuring that the manufacturing system as a whole is highly flexible, would be very expensive.[25] Hence the production of such components, (and a number of others where the costs of electronic control systems does not outweigh the cost of holding small buffer stocks), is controlled via a system of kanban cards and racks (Personal interviews).[26]

A kanban rack is simply a rack, or a set of shelves, which stores completed components ready for the next process (see plate 3.4). As components are used the lowering of the level of stock on the rack provides a visual signal to workers producing this component to replace the withdrawn components (Personal interviews). Kanban cards function in a similar fashion, but in this case production information is provided in written form via kanban cards. There are two basic forms of kanban cards, a withdrawal kanban and a production-ordering kanban.[27] The withdrawal kanban tells subsequent processes the type and quantity of parts they should withdraw from preceding processes, whilst the production-ordering kanban indicates what the preceding processes must produce. As a subsequent process withdraws components from a preceding process store they replace the withdrawn pallets with empty pallets. At the same time they replace the production-ordering kanbans which are attached to the full pallets with the withdrawal kanbans which had been attached to the empty pallets and place the production kanbans (in the order with which they were removed) in a kanban receiving post. The preceding process then collects the production-ordering kanban and empty pallets and manufacturers the orders as specified on the production-ordering kanban.

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variations is very expensive. Hence, for the time being at least, Fisher and Paykel continues to use large numbers of quite conventional machinery (Personal interviews).

24. Within the Refrigeration division the time needed to retool injection molding machine has been reduced from three hours to around 15 minutes. Similarly changing the dies and tooling on the largest presses at the Range and Dishwasher division used to take over four hours. This had been reduced to 28 minutes by late 1991 (Personal interviews).

25. If possible at all.

26. These buffer stocks are very small, at the most consisting of several hours production. For example, the stock of back panels is generally in the order of around half an hour's production (Personal interviews).

27. There are also a number of other kanban cards, but the withdrawal and production cards provide the essence of the kanban system (Monden 1981b).

As each pallet of components is completed the production-ordering kanban is attached to the pallet and returned to the store ready for use by the subsequent process (Monden 1981b, pp 29-30).

Whilst in essence the kanban system is relatively simple, a number of conditions must be met for it to function effectively:

1. *The cycle time (i.e. the time it takes to produce a single component) of each process must be known and adhered to.* To calculate the optimum number of kanban cards for each component, and hence the optimum level of inventory for the system, the operational parameters of each sub-system must be well defined. If cycle times are not known the production system will lack coherence with some processes holding excess inventory, machinery and labour, whilst others will be incapable of reliably supplying subsequent processes and hence will disrupt the smooth flow of materials through the system (Monden 1981a. Personal interviews).

   Ideally a system should be arranged such that the number of kanban cards circulating, allowing for the need to hold some stock to compensate for the lead time needed to produce a component, restricts the level of completed stock to zero. Normally, however, when calculating the optimum number of kanbans a policy variable is added to allow for some variation in output within a process (Monden 1981b, pp 41-42).

2. *Production must be smoothed.* A manufacturing system operating under a just-in-time basis should have integrated all its sub-systems to form a 'conveyor line' (to use Monden's (1981b, pp 40) term). To allow this to happen production must be organised in such a way that the withdrawals from each process are as even and constant as possible. The reason for this is simple. Each process within the system must hold enough machinery, labour, and inventory to respond to peak variations in demand for their component. Hence the greater the variation within the system the greater the level of slack that must exist within the system. Moreover, as under the kanban system information is conveyed backwards through the system - i.e. as parts are pulled to the assembly line rather than pushed towards it - the level of variation will increase with each preceding process. Thus to reduce variation to a minimum final production should be smoothed such that the demand for each process is as even as possible. This means that rather than producing

each model in discrete batches, daily production schedules should be organised so that each model is produced at an even rate throughout the day (Monden 1981a. 1981b. 1981c. Personal interviews).

3. *The production of faulty components must be as small as possible, and any faulty components must not be forwarded to subsequent processes.* If a process receives large numbers of faulty components the absence of buffer stocks will force the process to shut down until suitable components are available. Further, as this process will be unable to supply the necessary components for its subsequent processes the whole system forward of the process producing faulty components will also be forced to shut down. Hence to protect the integrity of the system each process must reduce defects to a minimum and ensure that only usable components are forwarded to the next process. This is a sharp contrast to fordist production systems which, based on the premise that a certain level of defects was unavoidable, were (are) designed to absorb relatively high levels of defective components. Hence it is necessary to have much more rigourous quality control mechanisms than within fordist systems (see Demming 1982 and Shingo 1986) (Monden 1981a. 1981b. Burt 1989, pp 128. Personal interviews).

This combination of networked flexible automated machinery, and machinery operating in small job lots controlled by the kanban information system, not only reduces work in progress (as well as improving quality standards as shall be seen later), it also creates a highly flexible production system. There are two basic dimensions to this flexibility; the ability to modify the volume and composition output, and the ability to introduce new models, and model variations, in response to new marketing possibilities.

Output Flexibility: Small fluctuations in either the composition or total volume of demand can be absorbed simply by changing the daily schedule fed into the system. Altering the daily schedule automatically modifies what the computer controlled operations will produce, and these modifications will in turn be transmitted to those process controlled by kanbans simply by altering the frequency with which the kanbans already circulating are exchanged. Still such fluctuations are not costless. Decreases in total demand will decrease the total level of capital and labour utilisation, whilst

increases in demand will, if they exceed the slack built into the system, require working overtime which in New Zealand has so far necessitated the payment of a premium to labour. Furthermore, the impact of changes in the composition of demand may vary from process to process, creating slack in some, whilst placing a strain on others. Hence to maintain the efficiency of the system long term fluctuations need to be accompanied by the recalculation of cycle times (as labour is reallocated within the system and temporary workers taken on or laid off), the resetting of the software controlling the assembly lines and automated machinery, and the alteration of the number of kanbans within the system (Monden 1981c. Cusumano 1985, pp 291-293. Personal interviews).

The need, where possible, to forecast major fluctuations in demand is further accentuated by the fact that some of the raw materials and components used by Fisher and Paykel are sourced from overseas suppliers. As a result many of these items have supply lead times of several months. Given these lead times it is imperative that Fisher and Paykel has an idea of the likely volume and composition of demand several months in advance of actual production. However, whilst the long supply times associated with imported materials represent a significant break (or imperfection) with the just-in-time ideal of single batch mass production, it should be stressed that the use of these materials does not undermine the basic flexibility within Fisher and Paykel's production systems (although it does place some limitations upon it). By reallocating the imported materials already in stock to different models, and varying the size of buffer stocks of these materials, it is possible to respond to shifts in demand within the lead times of imported components (Personal interviews).

Similarly many of the components which Fisher and Paykel sources from local suppliers are supplied on a weekly or fortnightly basis, and thus these suppliers must receive orders several weeks in advance of actual production. In an effort to overcome this asymmetry between the company's outside supply arrangements and the manufacturing systems it is using Fisher and Paykel has increasingly been insisting that its New Zealand suppliers deliver to a daily schedule, (although it should be noted that suppliers are still provided with monthly and weekly estimates of requirements). At the same time the company has been encouraging its suppliers to introduce just-in-time manufacturing philosophies. Thus rather than suppliers complying to Fisher and Paykel's demands by continuing to produce components in large lots and merely shipping them

in on a daily basis, suppliers should produce components when and only when they have received a firm order from Fisher and Paykel. The desirability of suppliers producing on just-in-time basis is closely linked to the sensitivity of Fisher and Paykel's production systems to quality problems. If a supplier producing within a just-in-time framework ships a batch of components with an unacceptable level of defects, it can, once it has been informed of the problem by Fisher and Paykel, quickly set about addressing the cause of the defects. In contrast, the ability of a supplier who is using traditional large batch production methods to respond rapidly to quality problems is constrained by the fact that by the time it discovers that it has a problem it will (most likely) have already manufactured several weeks supply of these components. In fact if suppliers are producing on a just-in-time basis they will be forced, just as Fisher and Paykel has been, to improve the quality control mechanisms within their systems simply to maintain the integrity of their own systems, hence lessening the likelihood of shipping defective components (Personal interviews. Personal documents).

A recurring theme throughout the last three paragraphs is the necessity of matching Fisher and Paykel's shop-floor flexibility with elastic managerial and planning structures. The maintenance of an optimum level of efficiency within a production system in the face of fluctuations in demand is dependent upon the marketing, material ordering, and production planning departments working in concert with each other. And this in turn requires a free and rapid flow of information within and between each of these departments (Personal interviews. Hayes and Jaikumar 1988). Recognising this, Fisher and Paykel have modified their information and financial systems, increased the porosity of the boundaries between each department, and redefined each department's organisational goals to reflect the importance of cross-departmental cooperation. Moreover, production, marketing, and inventory information is stored on a single central computerised data base which allows each department to accurately monitor the impact of other departments' activities upon its operations. Thus the ordering department, for example, uses provisional future production schedules (supplied from the marketing department) to calculate the material requirements necessary to produce to these production schedules (using information from the production department). The department then uses these calculations, and and its knowledge of the existing level of material inventory levels, to organise

the ordering and delivery of the necessary materials (Personal interviews).

Product flexibility: The ability of Fisher and Paykel's production systems to cope with fluctuations in the volume and composition of demand is paralleled by their capacity to allow the modification of existing products, or the introduction of new models within an existing range, in response to new marketing opportunities. During the mid 1980s, for example, Fisher and Paykel began supplying chest freezers to Sharp Corporation in Japan. In time Sharp replaced most of its model range with Fisher and Paykel Freezers. Fisher and Paykel's freezer range, however, did not include a 280 litre model, which was Sharp's largest selling model with a sales volume which equalled that of all the other models combined. Hence Sharp continued to sell a 280 litre freezer sourced from Hitachi - its previous main supplier. Sharp offered Fisher and Paykel the opportunity of producing such a model, which Fisher and Paykel designed and introduced in only a couple of months, thus immediately doubling the volume of the company's freezer sales to Japan. That Fisher and Paykel was able to respond so quickly to Sharp's request was largely due to the fact that the introduction of the new model could easily be accommodated by reprogramming its existing machinery. Still, the ability to exploit the possibilities of the programmable machines is crucially dependent on the information systems and organisational structures within Fisher and Paykel which facilitate the flow of information necessary to coordinate the rapid introduction of a new model (Personal interviews).

It should be noted, however, that modifications within a model range are generally more incremental, involving relatively minor modifications to existing models within a range - changing the colour or voltage for example - rather than the introduction of a completely new model. Furthermore, the degree to which Fisher and Paykel can rapidly (and profitably) modify its existing model range varies greatly from product to product. This variation arises from the different materials and processes needed to produce each product. For example, as the preceding discussion has shown, it has been possible to economically design and build programmable steel forming machinery capable of producing a wide a range of refrigerator cabinets. In contrast the construction of a stove requires many three dimensional pressings which, given the complexity and cost of designing machines which can be programmed along three

dimensions, restricts the degree to which the company's stove factory can rely upon programmable machinery. Hence variations within Fisher and Paykel's range of stoves and wall ovens are largely restricted to the features offered - the type of hob, clock, and so forth - rather than in the actual dimensions of the product. Indeed whilst Fisher and Paykel produce 13 different refrigerator cabinet sizes at its East Tamaki plant, its range factory produces only two different widths of free standing ranges, both of which are of the same depth and height (Personal interviews. Personal documents).[28]

Whilst Fisher and Paykel's SBP manufacturing systems allow the company to produce high quality, competitively priced, products in what by international standards are relatively small volumes, this only partly explains ability of the company to successfully market its products. Even with the introduction of the manufacturing techniques discussed above the small scale of Fisher and Paykel's operations still involve a cost premium compared to the lowest cost producers internationally. Hence the company has found it necessary to compliment its SBP production systems with products which are genuinely different from those produced by other companies, rather than producing clones of foreign designs as it had (with a few notable exceptions) during the 1950s, 1960s and 1970s (Personal interviews. Fisher and Paykel 1981-1991).

Reflecting this need, Fisher and Paykel have placed much greater emphasis upon market research to ensure that its products cater for the actual demands of the market for which they are intended. This did not in itself require any sharp break from the product paradigm which Fisher and Paykel had inherited from its earlier reliance upon foreign designs. Fisher and Paykel have continued to explore the possibilities of the technologies within this paradigm to redesign its existing models. For example the Award series of refrigerators introduced in early 1985, (which incidentally was the company's first model range to be manufactured in single batch fashion), did not mark a sharp break from previous refrigerator technology, rather it simply represented the reworking (and improvement) of existing refrigeration technology to create a refrigerator which was ideally suited to the New Zealand market (Fisher and Paykel

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28. It should be noted, however, that in part this difference between the dimensional variety of stoves vis-a-vis refrigerators reflects the fact that kitchens in New Zealand are designed to fit standard width and height of range, thus lessening the need to produce a wide range of stoves.

1985, pp 6). In fact up until the mid 1980s the sharpest breaks from the existing product paradigm involved shifts in the construction of products to aid the introduction of just-in-time manufacturing systems, which did not directly affect the functional parameters of Fisher and Paykel's products (although they did lower production costs).

Increasingly, however, Fisher and Paykel has been exploring the possibility of using micro-electronics to improve both the efficiency and functional capabilities of products. Generally, this has involved incremental changes to existing products, such as the use of soft touch controls on its dishwashers and wall ovens, allowing the company to minimise the technological risk of introducing micro-electronics. It is possible, however, to gain some insight into how the use of micro-electronics may revolutionise product design by looking at the electronically controlled clothes washing machine Fisher and Paykel introduced in October 1985 (Personal interviews. Fisher and Paykel 1986, pp 13. 1988, pp 14. 1991, pp 6. Examiner 1991, May 16, pp 12).

Throughout the 1970s and early 1980s Fisher and Paykel had been producing a medium-sized automatic washing machine (in a number of forms) whose design was directly derived from an automatic washer the company had previously made under license. Now whilst the company was throughout this period exploring a number of novel manufacturing techniques, the design of its automatic washing machine largely precluded the application of these systems to the autowasher production line. As a result Fisher and Paykel's automatic washing machines range generally consisted of only a couple of very similar locally built models, with the company relying upon imports to fill out its model line up (Ward 1987, pp 35. Yarwood 1987, pp 73. Consumer 1972, no 85. 1974, no 112. 1981, no 183. 1983, no. 207).[29] In response to these limitations the company began in the mid 1970s to explore the possibilities of designing a machine which could be profitably produced in a wide range of formats. The company could not, however, see any way in which it could produce such a machine using the then standard mechanical gearbox. Thus drawing upon the knowledge it had gained from manufacturing medical equipment and electronic

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29. For example in 1972 Fisher and Paykel made two models of automatic machines, in which the only substantive difference between the two was the fitting of a water heating element to the delux model (Consumer 1972, No 85). Similarly, in 1982 the company only made one fully automatic machine, although this was complimented by a machine which had been stripped of wash programming options (choice of water level, water warmth and so forth) and hence had only a single preset wash cycle (Frigidaire Home Laundry, sales Brochure 1982).

appliances such as colour televisions, Fisher and Paykel decided to examine the possibility of using an electronic gearbox in place of the mechanical one (Personal interviews. Yarwood 1987, pp 73. Ward 1987, pp 35).

The impact of the subsequent development of the motor (which was designed in cooperation with General Electric) and control technologies necessary for such a gearbox was not, however, restricted to the production systems which the company could now adapt for use on its autowashers.[30] By combining the electronic drive mechanism with a electronic main control panel, Fisher and Paykel were able to design a washing machine with a much wider range of functions than would have been possible with a similarly priced non-electronic machine. Moreover, the use of electronic drive and control mechanisms has facilitated the development of monitoring devices which allow Fisher and Paykel's machines to be highly responsive to the environment within which they were operating - adjusting the speed of the motor to the amount of load on the agitator and so forth - increasing washing efficiency, and lessening the strain placed upon clothes during washing (Yarwood 1987, pp 73. Ward 1987, pp 35. Australian 1992, May 5, pp.37).

This movement towards the use of micro-electronics within its products has made it necessary for Fisher and Paykel to establish extensive electronic sub-assembly facilities. Obviously such assembly work involves the use of processes which are very different in both form and scale from those used within the company's whitegoods manufacturing divisions. Fisher and Paykel was not without experience in this area, however. For many years the company had been involved in the production of electronic consumer appliances such as televisions and stereos (Sewell 1965, pp 128. Watson 1976). As with whitegoods, the production of electronic consumer appliances had originally been fostered by the use of import licenses. Unlike whitegoods, however, the electronic consumer appliance industry (except in few niche markets) was unlikely to ever reach a stage where it would be able to survive without substantial border protection. This had been recognised in the 1982 Electronics Industry Development Plan which set out a ten year timetable for the phasing out of import licensing protection (Industries Development Commission 1982). Working within this

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30. Such as machinery capable of producing a range of different wash bowel sizes which, in combination with the use of pre-paint steel forming equipment similar to that which was originally developed in the refrigerator division, allows the company to produce several different sizes of washing machines (The Australian 1992, May 5, pp 37. Ward 1987, pp 35. Personal interviews).

plan Fisher and Paykel reorientated its consumer electronics division towards the design and production of electronic components for both its whitegoods production divisions, and for use in health care equipment (which the company had been manufacturing since the early 1970s) (Examiner 1991, May 19, pp 12. Sunday Star 1987, February 8. Fisher and Paykel 1981-1991). Parallel to this, Fisher and Paykel has invested in Screencraft Manufacturing a New Zealand manufacturer of Printed Circuit Boards (PCBs), increasing its initial 30 percent holding to 55 percent in 1981 and to 80 percent in 1986, and in 1987 it entered into a joint venture with the Hong Kong based (but Indonesian owned) company Topsearch Industries to produce PCBs in the People's Republic of China's Shekou development zone (NZ Herald 1987, October 12. 1988, June 28. Fisher and Paykel 1981-1991).

The final, and perhaps most significant transformation within Fisher and Paykel's production systems has been the reorienation of the organisation of workers on the shop-floor. As has been hinted in the preceding discussion, the attainment of the preconditions for SBP manufacturing systems neccessitates a fundamental transformation in the manner in which the labour used to set each process in motion is organised vis-a-vis that of a fordist system. One of the defining features of the fordist paradigm was the existence of a well defined rigid shop-floor organisational hierarchy. The base of this organisational hierarchy consisted of unskilled and semi-skilled operatives who were viewed by management as talented enough, or perhaps more importantly trust worthy enough, only to execute simple well defined orders. Thus it was necessary to have several layers of more highly trained, educated, and (generally) more trustworthy employees to set up, monitor, and maintain the system.[31] Indeed, because of the need for these control functions, the shop-floor was not characterised by deskilling per se, but rather involved a bifurcation of skill levels between those formally involved in the

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31. It is important to stress that although the assumption of management that workers do not have a high level of comprehension about the machinery they are operating was central to the fordist system it does not necessarily follow that workers were in fact devoid of understanding of what they were doing (Wood and Kelly 1982, pp 77). Indeed frequently workers did have a high level of understanding of their operations. Furthermore, shop-floor management in many cases developed informal methods of tapping into that knowledge to ensure the smooth operation of the system (see for example Burawoy 1985, pp 128-137). The important thing to note is that such arrangements were informal, and were not recognised, or at least not to any great degree, by people higher up the managerial hierarchy.

conception of the various sub-processes within the system, and those who merely aided the execution of these processes (Thompson 1989. Altshuler et al. 1984, pp 137. Sayer 1986a, pp 49-50).

Such an organisational hierarchy is antithetical to the operation of a production system based upon just-in-time manufacturing principles. This is not to say that such systems involve a wholesale rejection of the taylorist methods which underlay the fordist system. It does, however, involve a fundamental reorientation of the application of these techniques.

As has already been stressed, knowledge of process cycle times and adherence to these cycle times is a necessary prerequisite for operation of a production system on a just-in-time basis. Once this information has been obtained - via detailed time and motion studies - and cycle times set, workers must operate within these cycle times if the smooth flow of material through the system is to occur (Monden 1981a, pp 39-40. Personal interviews). In this sense Fisher and Paykel's manufacturing systems adhere to taylorist dictums. However, whilst taylorist (and fordist) organisational structures allow the worker only minimal responsibility, within Fisher and Paykel many maintenance and quality functions have been delegated to the people who actually operate the process. There are two reasons for this. Firstly, as any faults that develop within a process will within a short period be transmitted through to the rest of the system, any faults must be quickly corrected. Thus it is necessary for operators to be capable of fixing any minor problems that may arise. Furthermore, if a problem arises which cannot be fixed by the operators, information on this problem must be relayed to someone who is capable of fixing it. Given this need for rapid information flow it is important that organisational hierarchies are kept as flat as possible. Secondly, it is not possible - or rather it would be prohibitively expensive - for supervisory staff to enforce the quality standards required within just-in-time manufacturing systems.[32] Hence production workers must be trusted to carry out simple quality checks, ranging from the inspection of the preceding workers work, to filling in and interpreting statistical control charts (Personal interviews).[33]

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32. Indeed taken to its extreme this would require a quality control supervisor for each individual worker.

33. It should be noted that such monitoring of quality Standards by workers is not Fisher and Paykel's only response to the necessity of keeping defects to a minimum. The company has also made a concerted effort to build quality into their production systems by designing components so that they can easily be manufactured and assembled, and using machines with autonomation (a word coined by Toyota) devices

This delegation of authority down to the lowest possible level is a sharp break from taylorist norms. In taylorist systems knowledge (or rather formal knowledge) of how the production system operates is the exclusive domain of management. In contrast the operation of Fisher and Paykel's production systems are dependent upon a sharing of information between management and labour. Ideally once the tasks and cycles have been defined by management the shop-floor workers should essentially run the system, reducing the activities of specialist maintenance and regulatory staff to crisis management (such as fixing major machine failures) and overall system planning and maintenance (Personal interviews. Radio New Zealand 1991. Walton 1985). In fact worker involvement goes further than this. Fisher and Paykel have also developed communication channels which encourage workers to suggest methods to improve the efficiency of the system. Thus, again ideally, the shop-floor production system is not a static entity but rather is constantly evolving product of the losely structured but intimate dialogue between workers and management (Personal interviews. Leborgne and Lipietz 1988, pp 269. Sayer 1986a, pp 53).

The attainment of such ideals is, however, difficult. Workers need to have an in depth knowledge of a wide range of processes, as well as a clear understanding of how the system as a whole works, why cycle times must be adhered to, and why faulty components must be reduced to a minimum. And managers must cease to see their role as being that of an overseer and instead act (and be trained to act) as facilitaters for the workers for whom they are responsible (Personal interviews. Walton 1985. Klien 1989). Given these difficulties, the transformation of organisation hierarchies must of necessity be viewed as a long-term project. Indeed although Fisher and Paykel have been working towards the ideal of single batch production on a just-in-time basis for many years and have since 1985 been introducing kanban information systems into their factories, they have only in the past year been actively attempting to reduce the depth of their shop-floor hierarchies (Personal interviews).

That said it is interesting to briefly look at the Atlas plant (now renamed Simpson Appliances (NZ)) which has since late 1990 been moving towards prodution on just-in-time principles.

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which automatically check the standard of the component being processed or assembled. (Personal interviews. Shingo 1986. Monden 1981a, pp 43-46).

Restructuring on a Tight Budget - The Simpson Approach

Despite the collapse of Stride Corporation in April 1988, the Atlas plant continued to make losses throughout 1989 and 1990. These continued loses reflected both the age of equipment within the Simpson plant, and the fact that the factory continued to the rely upon what were by now largely outmoded (at least for a factory of Simpson's size) fordist production principles. Yet Email was not prepared to invest in modernising the plant.[34] Instead it appointed a new plant manager who has been attempting to restore profitability by reorganising the factory's production system along just-in-time principles. Final assembly is now organised on a daily rather than a monthly schedule (see plate 3.14). Machinery setup times have been substantially reduced (see plate 3.12). Quality control has become the responsibility of shop-floor workers. And managerial structures have been reorientated with the aim of encouraging worker input into the design of the production process (Personal interviews. Personal documents).

Just as at Fisher and Paykel, these moves have led to substantial improvements in the overall efficiency of the Simpson factory. Finished goods inventories have been reduced. Quality has been improved. And much waste within the system removed (Personal interviews. Personal documents). Still it is important to note that Simpson's reliance upon aging machinery is not without its limitations.

Simpson's existing plant and machinery is in some respects incompatible with the just-in-time manufacturing philosophies it has been introducing. The need to immerse components in a chemical bath prior to enamelling, a procedure which has been eliminated in more modern plants (such as Fisher and Paykel's), for example, hinders the smooth flow of material through the system. Similarly, without substantial modifications to the existing presses and tooling it is unlikely that setup times will be reduced to a level that allows the company to produce on a truly just-in-time basis (Personal interviews. Cusumano 1985, pp 286-287).[35] What-is-more elderly equipment naturally exhibit more output variation than their modern equivalents. Not only are modern machines designed to produce

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34. Email had, however, put back much of the quality which had been taken out of Atlas ranges in the mid-1980s (Personal interviews).

35. Simpson's press shop currently operates on a weekly schedule. It should be noted that Fisher and Paykel's Range and Dishwasher Division's press shop does not (or did not at the time of writing) work to pure just-in-time system either (Personal interviews).

within finer tolerances, such machines also frequently (as has been stressed earlier) incorporate micro-electronic devices which automatically adjust for any movements outside of these tolerances (see plates 3.11-3.13). This is not to deny that fluctuations within a system which uses machines with a relatively high degree of variation can be effectively controlled. Rather it is to point out that the task of containing natural fluctuations becomes somewhat harder the higher the level of variation. And that higher levels of variation also necessitate the use of larger buffer stocks to protect the integrity of the system (Monden 1981b. 1981c).

Thus whilst Simpson has managed within a very short period to substantially improve the overall efficiency of its production system, and is likely to continue to do so, it is has necessarily been pursuing what is a technologically second best strategy.[36] Whether Simpson will be allowed the capital to widen the scope of its production reforms in the future is dependent upon how Email decides to integrate the Simpson plant within its marketing network. Apart from a cheap range introduced in late 1991 the Simpson factory remains the sole supplier of ranges to the New Zealand market within the Email group. It also exports some ranges and cooktops to the Australian market under the Email owned Westinghouse brand name. That the Simpson factory is capable of producing ranges at a cost similar to that Email's Australian range factory; that the New Zealand and Australian range markets are not identical; and that the factory has survived thus far, would seem to suggest that in the immediate future at least it is likely that the Simpson factory will continue in a manner similar to that which has over the past year (Personal interviews). What will happen in the longer term remains an open question.

And Finally, What of Labour Relations?

As has been stressed above, both Simpson's and Fisher and Paykel's production systems are dependent upon the mobilisation of workers in real time. Organising workers in such a manner is, however, something of a double edged sword. Whilst mobilising workers in real time allows for significant improvements in efficiency, it also greatly enhances shop-floor workers ability to disrupt the production process. Thus workers must be motivated to work in accordance with managerial imperatives for such

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36. Or as the the plant manager puts it Simpson has had to pursue a strategy using 'adequate technology' coupled with 'high technology managemsnt' (Personal interviews).

forms of work organisation to operate effectively. This requires that the introduction of such shop-floor practices are paralleled by the establishment of over arching labour relations structures which orientate workers interests towards those of management.

There are, not surprisingly, a number of avenues by which such structures may be reached. Simpson, due to the youth of their organisational reforms, had at the time writing, done relatively little work in this area, relying instead upon the fact that the threat of closure has created a stong commonality of interest between workers and management. In contrast, Fisher and Paykel have been working intensively over a number of years to redraw their plant level labour relations framework, and it is to the story of how they have done so that the next chapter will turn.

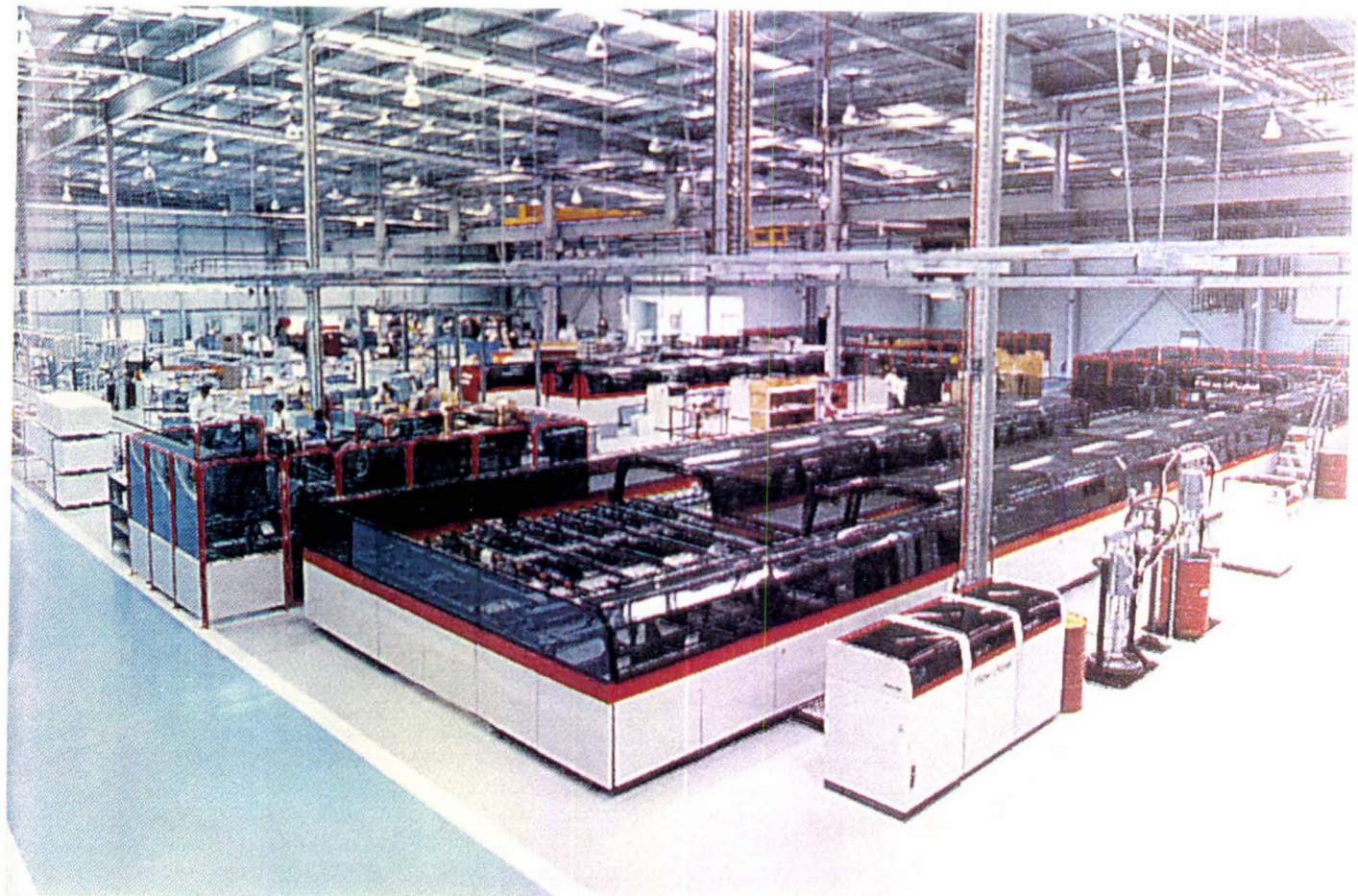

Plate 3.1. Fisher and Paykel's Cleveland (Australia) refrigerator factory - 1991 (source. Fisher and Paykel. 1991).

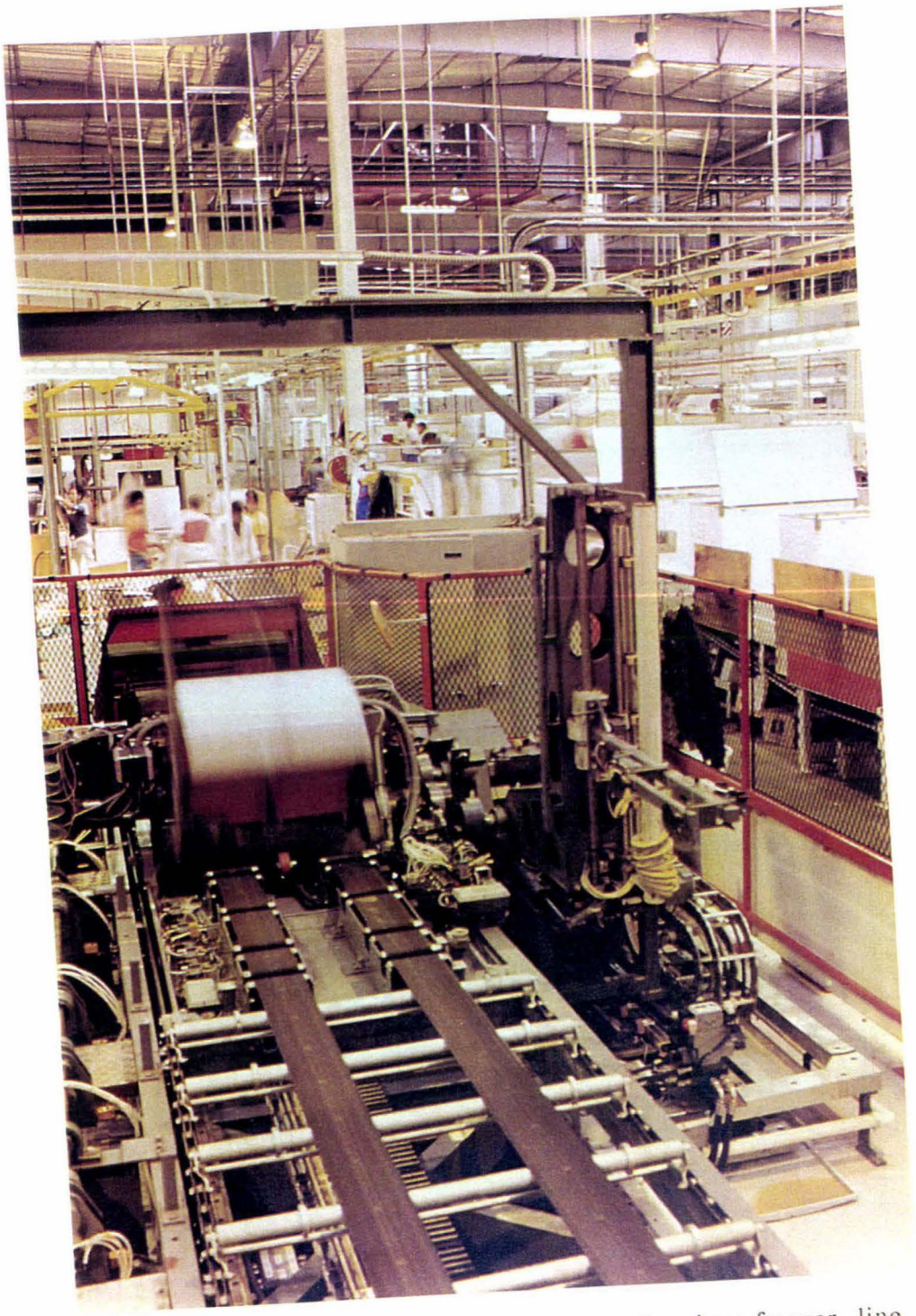

Plate 3.2. Steel forming equipment on Fisher and Paykel's chest-freezer line at East Tamaki (Auckland) - 1987 (source. Fisher and Paykel. 1987).

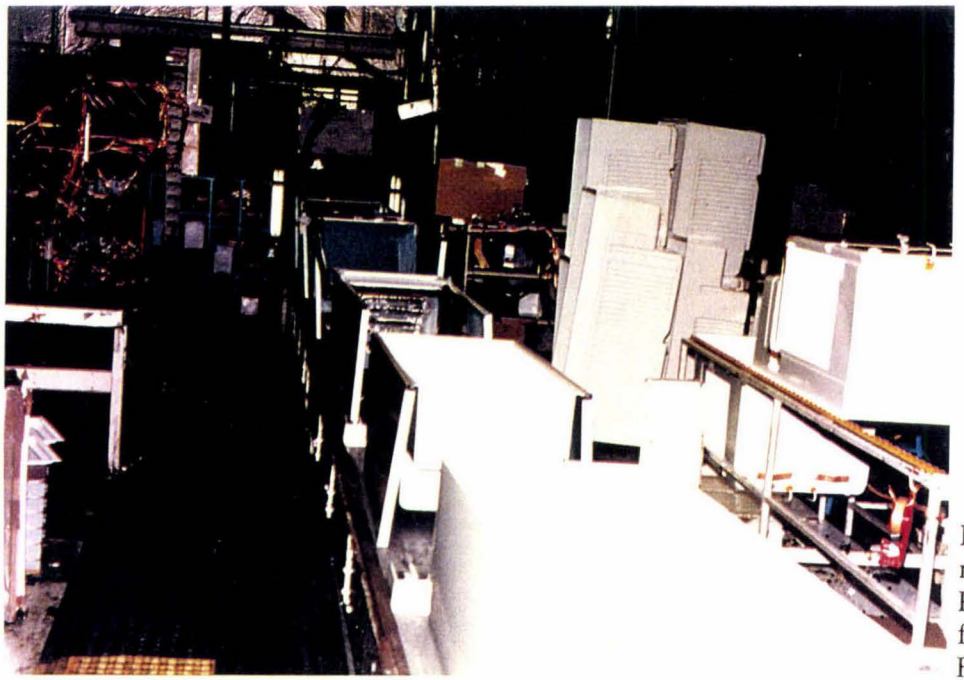

Plate 3.3. The beginning of the main refrigerator assembly line at Fisher and Paykel's East Tamaki (Auckland) refrigerator-freezer factory - 1991 (source. courtesy Fisher and Paykel).

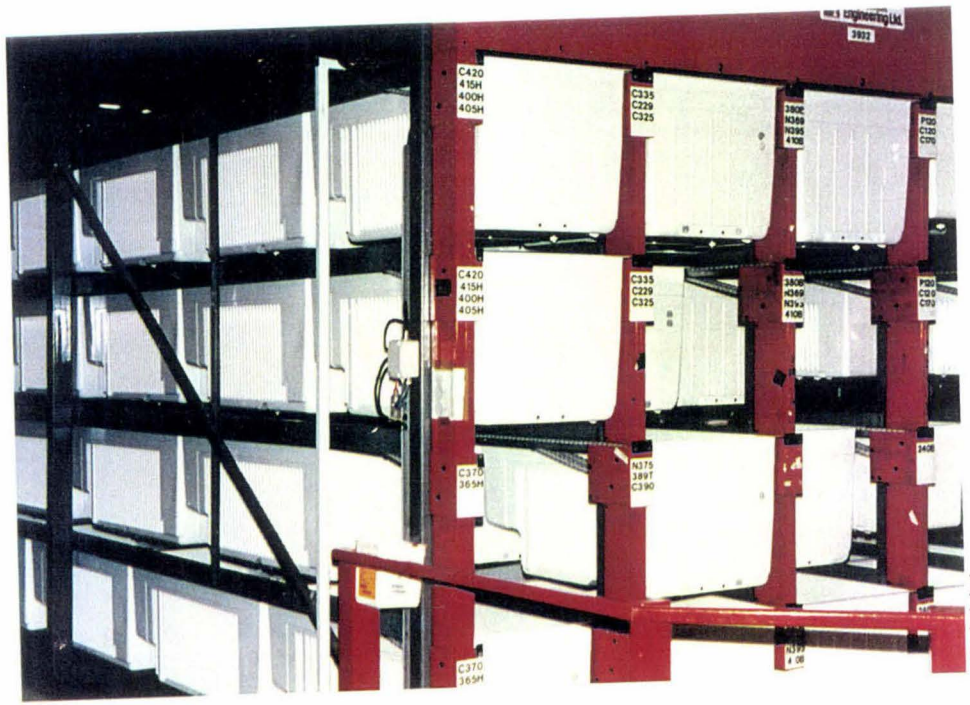

Plate 3.4. Kan Ban rack for refrigerator liners at Fisher and Paykel's East Tamaki refrigerator-freezer factory - 1991 (source. courtesy Fisher and Paykel).

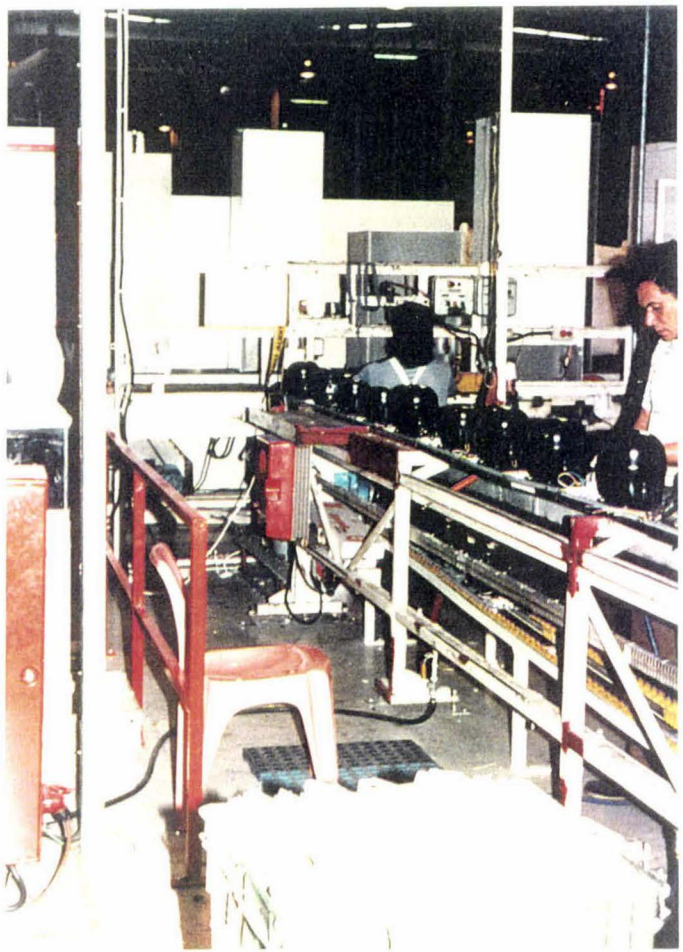

Plate 3.5. Refrigerator compressor sub-assembly line at Fisher and Paykel's East Tamaki refrigerator-freezer factory - 1991 (source. courtesy of Fisher and Paykel).

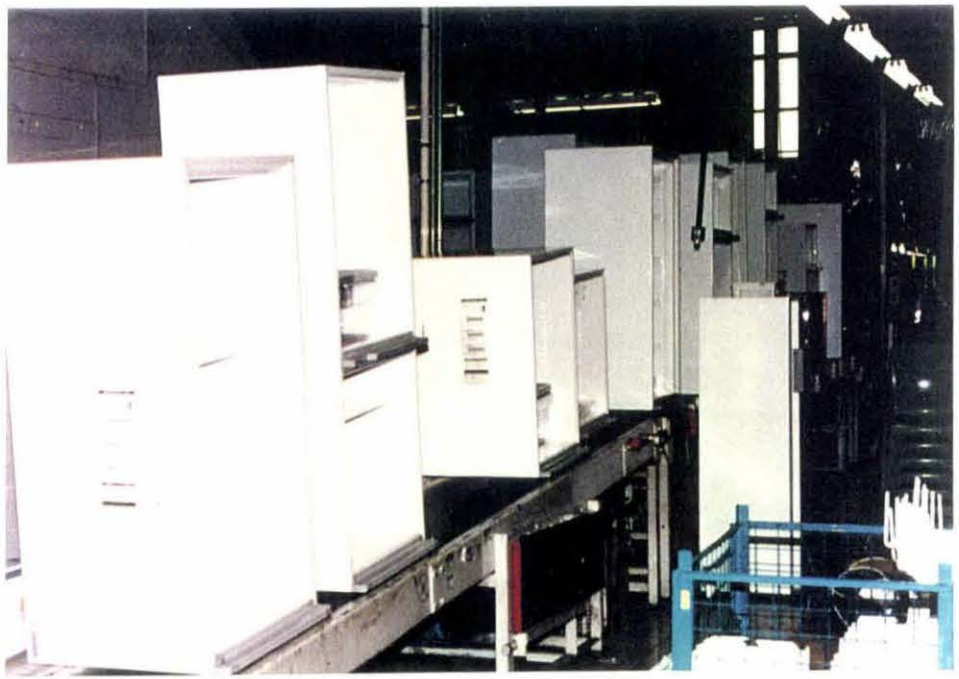

Plate 3.6. Fully assembled refrigerator cabinets prior to the attachment of doors and shelfs - Fisher and Paykel's East Tamaki refrigerator-freezer Factory 1991 (source, courtesy of Fisher and Paykel).

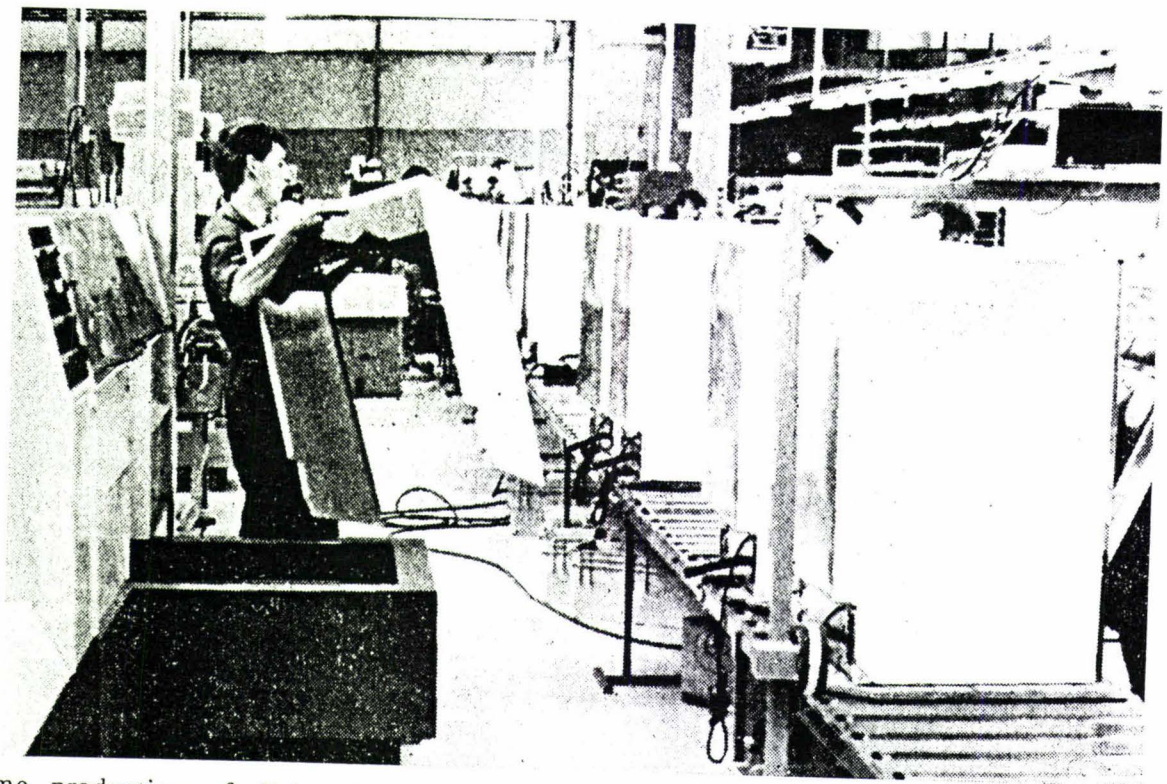

Plate 3.7. Just-in-time production of dishwasher cabinets at Fisher and Paykel's Mosgiel (just out of Dunedin) range and dishwasher factory (source. Otago Daily Times. 1986. November. 14).

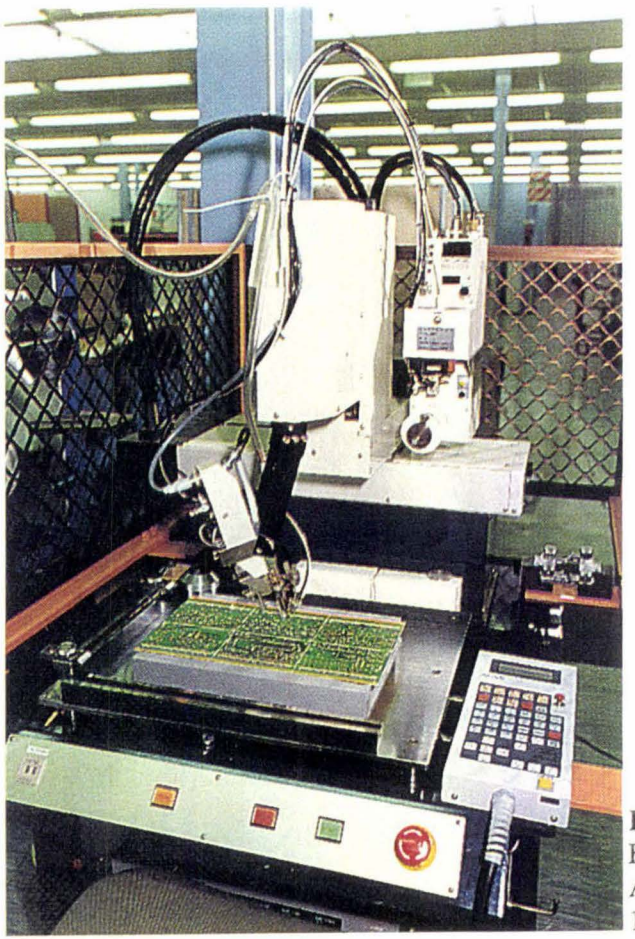

Plate 3.8. Automatic soldering machine at Fisher and Paykel's Electronics Division in Auckland - 1990 (source. Fisher and Paykel. 1990).

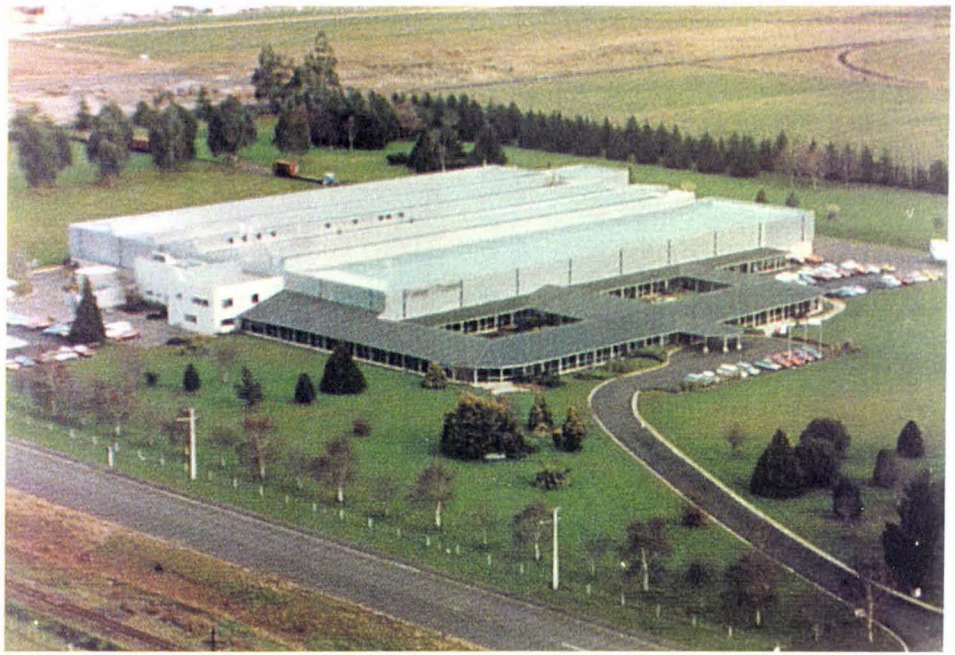

Plate. 3.9. (above) Fisher and Paykel's East Tamaki (Auckland) site with its refrigerator-freezer factory in the foreground - 1990 (source. Fisher and Paykel. 1990).

Plate. 3.10. (left) Fisher and Paykel's range and dishwasher factory at Mosgiel (just out of Dunedin) - 1990 (Fisher and Paykel. 1990).

Plates 3.1-3.14.

The machinery in the foreground of plate 3.1 shows the steel forming equipment used within Fisher and Paykel's refrigerator factories. The steel forming processes - notching, forming and folding - are entirely automated, with human intervention restricted to programming and maintenance. The increasing level of automation, combined with increasing efficiency of design and construction, have allowed the number staff within Fisher and Paykel's East Tamaki (Auckland) refrigerator-freezer factory to be reduced by half since the early 1970s, despite a 75 percent increase in total output (Fisher and Paykel. 1991. pp. 4).

Plate 3.3 shows the coming together of the refrigerator carcass at Fisher and Paykel's East Tamaki (Auckland) factory - a wrapper and liner can be seen in the mid ground, the edge of an assembled freezer tank for a dual temperature refrigerator can be seen in the left-hand corner. The timing of each of the main steel components for this stage is coordinated by computer. Several of the latter sub-assembly lines (such as the compressor line) are also controlled in this way (plate 3.5). The supply of many other parts to the line, however, is controlled by a system of kan ban cards and racks. The production of plastic liners, for example, takes substantially longer than the time taken to form the outer cabinet, therefore they are produced in advance of the wrapper and then held in a kan ban rack from which they are removed when needed (plate 3.4 and 3.3). Plate 3.6. provides a useful illustration of the single batch nature of Fisher and Paykel's production system, the refrigerators in the background of plate 3.5 further illustrates the point (compare this to plates 2.3 and 2.4).

The sorts of production systems being used by Fisher and Paykel require large amounts of open floor-space (as, it should be noted, did their fordist systems). Fisher and Paykel have built large single storey, open plan, buildings for each of their main whitegoods divisions (that is the Range and Dishwasher Division, Laundry Division, and Refrigeration Division) (plates. 3.9 and 3.10). The Refrigerator Division was the first (in 1972) to get a completely new factory. The Range and Dishwasher Division (then H. E. Shacklock) moved to a new factory in Mosgiel (just out of Dunedin) in 1978. And the Laundry division, which had been operating in the company's Mt Wellington (Auckland) plant (where Fisher and Paykel's refrigerators and freezers had been made up to 1972), moved to the same site as the Refrigeration Divison in 1991, (the building in the top of plate 3.9. has been converted into the Laundry Division's new factory).

In contrast to Fisher and Paykel, Simpson (NZ), and its earlier manifestations, has been on the same site since the late 1870s (plate 3.11). This site is easily large enough for the company's current activities. However, rather than having a single building, production at Simpson is spread through a number of inter-connected buildings. This presents something of obstacle to the coordination of materials through the factory (although by no means an insurmountable one).

Simpson has also had to rely upon existing, aging, plant in its programme to introduce just-in-time production principles (note the mix of model types in plate 3.14 and compare with plate 2.12, also note the small size of the completed product in plate 3.12 compared to plate 2.9). Of its two large presses one dates back to the late 1940s (plate 3.12) when pressed steel ranges were first produced in the factory (it should be noted that several of the presses at Fisher and Paykel's Range and Dishwasher Division are of a similar vintage), and the other, although newer, is of conventional design (i.e. it is not computer nor numerically controlled). Similarly, Simpson's enamalling plant was installed in the 1960s and has not been substantially modified since. Enamel is still applied to components by dipping or hand spraying of an enamal slurry (plate 3.13), in contrast to Fisher and Paykel where enamal powder is applied electrostatically (Personal interviews. Otago daily Times. 1986. November. 14. pp. 47).

Plate 3.11. Simpson's electric range factory - inner-city Christchurch 1991 (photograph by Matthew Oliver).

Plate. 3.12. Sheet metal press at Simpson (NZ) - 1991. This press has been in the factory since the late 1940s (photograph by Matthew Oliver).

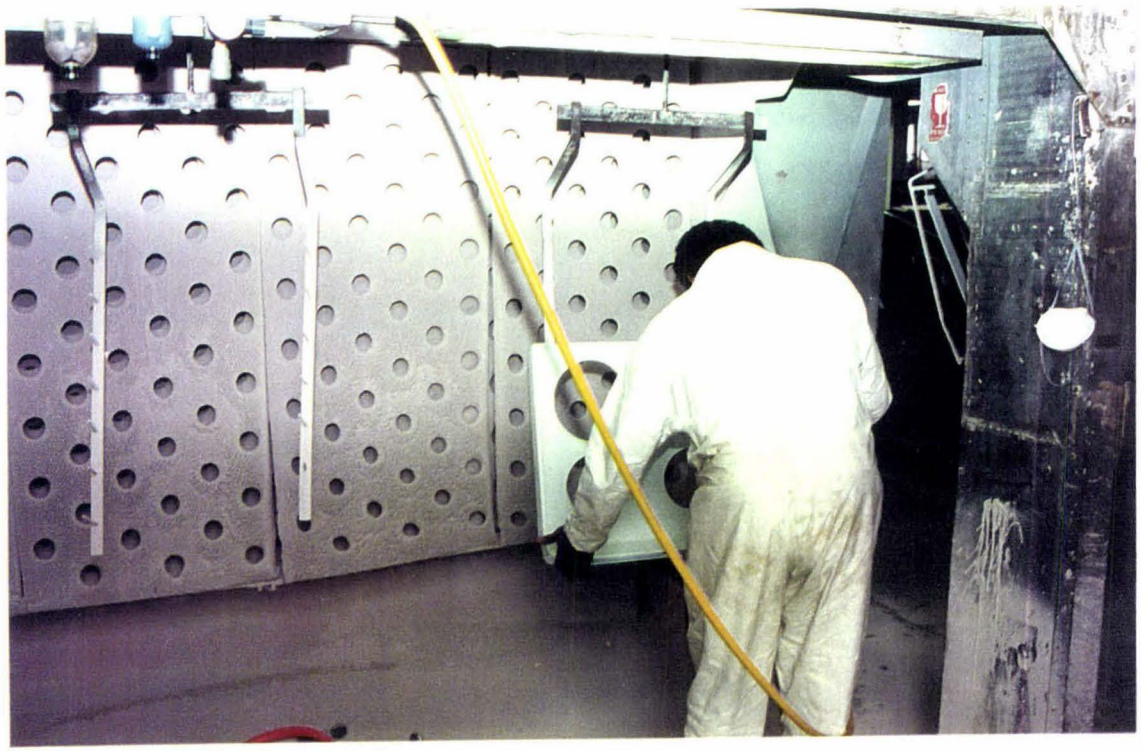

Plate. 3.13. Application of enamel slurry to range-hobs at Simpson (NZ) - 1991 (photograph by Matthew Oliver).

Plate 3.14. Final inspection of ranges at Simpson (NZ) - 1991 (photograph by Matthew Oliver).

CHAPTER FOUR

The Search for a New Mode of Development and the Whitegoods Industry in the 1980s and 1990s Part II - Labour Relations

"I say unto one, Go, and he goeth; and to another, Come, and he cometh; and to my servant, Do this, and he doeth it."
(Luke 7: 8).

"Work place reform is about unlocking people's potential, making sure they don't leave their brains outside the factory gates. When you get people to manage their own part of the the organisation the result is absolute magic."
(Colin Maiden. Former managing director of Fisher and Paykel).

For convenience sake it has been assumed thus far that management can organise labour as it will. Unfortunately life is not so simple. Labour has the capacity, and not infrequently the motivation, to challenge management's control over the production process. Any company must, therefore, balance inclusive consensus based labour relations strategies with more exclusive coercive strategies, whilst ensuring that these strategies mesh with the competitive imperatives faced by the firm. At the same time the field of movement within which a company may seek such a balance, will be constrained by the specific institutions and social norms in existence at that time and place.

During the post-war period, plant level labour relations structures were dominated by an occupationally based, centralised, collective

bargaining system. The viability of this centralised system was premised upon a loose and shifting compromise between employers, labour, and the state, which moved the primary site of struggle between labour and employers from the work-floor up into state institutions. This shift meshed nicely with the the fordist-taylorist labour processes that characterised the whitegoods industry throughout the 1960s and 1970s, as it allowed managers a high degree of autonomy in organisation of the work process. On-site labour relations were characterised by assertive exclusionary forms of labour control. Consensus was not entirely excluded from the work floor, yet it was generally informal, unofficial, and fairly shallow.

As the last chapter demonstrated, fordist production systems have significant costs in terms of quality and operational flexibility, costs that have become unsustainable with the evolution of increasingly fast moving and demanding markets over the past decade. As has also been seen, one of the key components in circumventing the quality and flexibility problems inherent within the fordist system involves the mobilisation of workers in real time. This has involved not only delegating some quality control and maintenance functions, but also, and more significantly, the development of communication channels between workers and managers that allow a rapid and undistorted flow of information. Such developments are incompatible with both the fordist system of on-site labour relations, and the centralised institutions that support it. Which raises the question of what labour relation forms are compatible with these developments?

This chapter is centred on Fisher and Paykel's attempts to answer this question, and the national industrial relations framework within which their efforts were set. Before turning to these efforts, however, it is necessary to firstly set out the fundamental relationships that define the labour relations problematic.

The Wage Relation

Productive relations within capitalist social systems are structured by the uneven power relationship that exists between capital and labour within such systems (Burawoy 1985). This unequal relationship is the product of the historical development of two general conditions:

1. Wage earners are alienated from the means of production and must therefore sell their labour in order to gain access to any commodities they may, for whatever reason, wish to consume.

2. Wage earners are free to sell their labour to whoever they choose. That is they are not legally bound to supply their labour exclusively to any one agent as they are under situations such as serfdom or slavery. (Braverman 1974, pp 52).

Under these conditions capitalists have the legal right, that is a right sanctioned and backed by the state, to all the goods that are produced by those employed by them.[1] It follows that the capitalist will receive any surplus over the cost of production that may (or may not) accrue from the sale of these goods. Furthermore, the capitalist's choice of labour process is no longer restrained by custom and tradition. A capitalist has the right, within certain legal bounds, to use the labour he or she employs howsoever he or she chooses. That is they are free to define how a process is executed and by whom, and they are free to introduce new technologies that may challenge existing production norms (Braverman 1975, pp 60-64).

The ability of the capitalist to effectively organise the labour process is severely constrained, however, by the fact that there is no guarantee that labour will do as it is bidden. Although labour has been turned into a commodity, it has not ceased to be human. As such workers have a dual existence. A worker's identity is at once subordinated to that of the machine he or she operates, whilst at the same time the worker maintains his or her identity independent of the machine. Given that labour has this dual existence, at no stage of the production process does the capitalist have total ownership, and thus control, of the labour force it has hired (Offe 1985, pp 23-24. 57. Braverman 1975, pp 57-58).

The most obvious route to achieve control would involve the drawing up of a contract that specified the precise nature and quantities of the tasks that the individual employed must carry out. Such contracts are difficult to draft as a wide range of forces outside the direct control of either the individual capitalist or worker impinge upon the labour process, undermining the possibility of successfully fulfilling a contract. More importantly such a contract would destroy the very advantage that labour

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1. Although the term 'capitalist' suggests that there is a specific individual who is organising the production process for their own profit, it is being used here to represent both cases where there is a direct and obvious owner of the means of production - such as in the case of a family firm - and instances where the actual owners of the means of production are obscured, such as in the case of the modern corporation. It should be noted, however, that the form of ownership and control of an enterprise is not without significance, both in terms of how the enterprise reacts to outside influences, and in terms of how it organises and legitimates its internal production structures (Edwards 1979).

power offers to the capitalist, that is its plasticity - to use Offe's (1985, pp 56) term. If all the conditions of employment were defined the capitalist would have to negotiate a new contract if he or she wished to redefine an individual's work tasks during the course of an existing contract. Such a situation would severely restrict the freedom of movement of the capitalist, thus it is in the interests of the capitalist to leave a certain indeterminacy in employment contracts. The necessary level of indeterminacy can generally be obtained by entering into employment contracts that only set basic pay rates and conditions of employment. Under such conditions the capitalist is free both to allocate workers to whatever tasks the capitalist chooses, and to reallocate or redefine work tasks whenever he or she feels such a change is necessary. This flexibility has a fundamental drawback, however. Under such employment contracts there is no contractual guarantee that a set amount, nor even a set quality, of labour power will be provided, and so it is up to the capitalist to ensure that an adequate standard of work is achieved (Offe 1985, pp 20-25). This brings the discussion back to the original question, how does capital achieve the control and consent of its workers?

A Question of Control - the Labour Relations Problematic

There is no simple answer to the question of control. It is a concrete problem that can only be understood with reference to a given historic-geographic conjunction (Thompson 1989, pp 151). Still, it is possible to isolate three fundamental axes around which labour relations are spun.

1. *The balance between coercion and consent.* The wage labour relation, as has already been pointed out, is based upon the structural inequality inherent in the fact that labour must sell its labour power to survive. It follows that, as a whole, labour does not have the ability to modify the amount of labour that is supplied to the market. That is to say labour cannot protect its market position by making a strategic withdrawal from the labour market. Moreover, this structural disadvantage is reinforced by the reality that the long term supply side trends in the labour market are shaped by factors, such as demographic movements, that can not be manipulated to improve labour's strategic position (Offe 1985, pp 16-17).

Despite these disadvantages workers can, and do, attempt to over come their poor market position. At the individual level this involves such strategies as the acquiring of skills and qualifications that are highly sought after by employers. Given the extent of the power imbalance between capital

and labour the possibilities of such strategies are limited. Recognising this workers have attempted to overcome the limitations of individual action by forming coalitions and thus confronting employers with a united front. Whilst the use of collective strategies has the potential to equalise the power differential between employers and workers, it can not be used to universally improve the position of labour vis-a-vis that of capital. In part this is because of the difficulty of holding together a coalition in the face of the significant benefits such a strategy presents to free riders. More significantly, the success of such collective action depends upon the exclusion of certain sections of the labour force that would undermine the solidarity of the collective (Offe 1985, pp 25-35). All this is somewhat depressing, to quote Offe...

> ...consideration of such mechanisms suggest a sobering conclusion: The primary front on which the supply conditions of employees struggle is not that of the 'primary' power differential, that is, the 'class front' between supply and demand in the labour market; instead, this struggle is located at the front of the 'secondary' power differential, at which the *distribution* of income, working conditions and employment opportunities *within* the totality of employees is decided (Offe 1985, pp 34-35).

Despite the fact that such strategies are only operating on the level of the secondary power differential, they should not be discounted. If, by either group or collective action, a worker can differentiate him or herself from the general mass of workers, he or she is then in a strong position to resist and subvert management's control of the production process. It follows, in the short term at least, that in such cases an employer will have to avoid coercive forms of labour relations in favour of more consensual forms. In the long term such privileged groups will most likely have to struggle to maintain their position in the face of technological, and organisational innovations. Still, any reorganisation of the production process opens up a new field of possibilities within which workers can seek to gain market power. And those who were most privileged in the past are frequently in the strongest position to exploit these possibilities, and thus perpetuate their privilege (Offe 1985. Edwards 1979. Burawoy 1985).

2. *The degree of state involvement in employment conditions.* The limits of work based strategies has forced workers to move up a scale, and attempt to influence the state in its defence. This has involved two general strategies.

Firstly, there has been an intensive struggle over the past hundred years, throughout most of the advanced capitalist countries at least, to establish state funded social security systems. Such systems allow workers to exist, for a limited time at least, outside of the labour market, and thus in part undermines one of capital's primary strategic advantages (Burawoy 1985, pp 125-126). The leverage given by social safety nets should not be over stated, however. Whilst the establishment of such facilities undermines the economic significance of the threat of dismissal, the status implications of such a threat carries a large burden within many sectors of the labour force. Further, the existence of social safety nets allows employers, in tacit collusion with those workers who have managed to establish a privileged market position, to actively differentiate between the types of jobs offered to those with market power and those in more marginal positions. The operation of these discriminatory strategies creates a flexible pool of relatively unskilled and compliant workers, whilst at the same time protecting the privileged workers from the vicissitudes of the wider economy (Offe 1985, pp 35-44.).

The second area in which the power of the state has been harnessed by labour, rotates around drawing the state into the direct regulation of pay rates and conditions of employment. This involves a dual strategy. At a general level it is possible to establish and develop a body of legislation which universally limits employer autonomy. Legislation of this form includes minimum wage acts, acts that set limits on the length of the working day and so forth. These relatively abstract forms of legislation are usually combined with legislation that seeks to legitimate and formalise the existence of worker collectives such as trade unions. In exploiting such strategies labour effectively places the state between itself and capital and therefore diffuses the potential for direct conflict between the two (Burawoy 1985, pp 126. Edwards 1979, pp 161-162).

Still, there are a number of catches. The extent to which labour is able to protect itself with such overtly political strategies depends on the ability of labour to form a coherent political force. Thus it is unlikely that a labour force that is organisationally weak at the enterprise level will have the power to effectively challenge those who currently hold the reigns of state power. Furthermore, the state can be viewed as a mirror that reflects, albeit somewhat imperfectly, the general power differentials of the social system within which it exists, and as such it is unlikely that the most disadvantaged groups will be able to gain much leverage through it. As such most state

interventions in the labour market are likely to exhibit a strong bias towards those groups who have already managed to obtain a degree of market power. The final flaw of state backed strategies, is that whilst they legitimate the efforts of trade unions, and establish a range of structures through which workers can defend their rights, the perpetuation of these rights depends on the workers agreeing to operate only within the boundaries set by the state legislation (Edwards 1979. Amberg 1991. Hollows 1974. Wood 1974).

3. *The enterprise's competitive strategy*. Whilst the establishment and maintenance of control and consent are fundamental dimensions of the production process, as the preceding chapter has shown they are not the only, nor necessarily the defining, features of the production process. Any given production process involves a compromise between the combined pressures of cost, quality, and flexibility. The structures of control in force and the balance between these mechanisms and more consensual structures, must be dovetailed to meet these imperatives. Still the range of technological and organisational possibilities open to a capitalist is fundamentally constrained by the labour relation pattern within which it has been operating in the past (Coombs 1985, pp 142-150. Littler 1985, pp 18-26).

Each of the above points suggests that an individual company's labour relations structures must be seen not in isolation, but rather as a set of characteristics which are embedded within a range a wider institutions and norms. During stable periods of régulation these norms and institutions will (generally) be clearly defined, and hence the field of opportunities which the balance between coercion and consent may be found will be highly structured. This field will widen, however, during periods of structural crisis as the logic of the existing institutions are brought into question by both the introduction of new labour relations structures at the shop-floor level, and by shifts in the form of other institutions in response to the crisis (Armstrong et. al. 1984, pp 379-398. Boyer 1988a, pp 76-77. 1988d, pp 199-112. 1988e, pp 229-239).

The Post-War Structure of Labour Relations

New Zealand capital and labour existed in an uneasy compromise throughout the post-war period. Although less than perfect, and vulnerable to breakdown, this compromise meshed neatly with the post-war mode of accumulation. Put very simply, this compromise, which perhaps more

accurately should be referred to as an historical balance of power, involved labour withdrawing from extensive work-floor agitation and allowing management the prerogative to organise the production process as it pleased. In return, management agreed to work within a set of rules covering pay and conditions negotiated at the state level. Indeed the state was central to the whole system. The state provided, and policed, a range of mechanisms such as compulsory unionism, and compulsory arbitration, which greatly enhanced labour's power vis-a-vis that of capital. These concessions where not unconditional. In return for state protection, the unions, that is labour's representatives, were bound to work within a set of boundaries defined by the state. Any attempt to manoeuvre outside of these boundaries was liable to bring the full force of the state upon the transgressor. Thus labour's complicity in the system rested as much on the implicit threat of state coercion as it did on a genuine belief on the fairness of the system (Howells 1974. Woods 1974. NZ Employers Federation 1978, pp 6. Chapman 1981, pp 357-358. Jesson 1989, pp 7-21. Brosnan et al. 1990).

Although a state backed, centralised system of bargaining, successfully defused industrial conflict, it also made for a rigid industrial relations system. Awards were set at either a national or regional level and tended to settle in a tight band around a couple of key awards and as such many awards were frequently out of touch with individual industry conditions. Further, a number of award rates reflected a range of historical relativities that had, through time, become increasingly nonsensical. The system also had a number of unfortunate side effects at the plant level. It was not uncommon for legally recognised demarcations to severely restrict management's strategic possibilities. Additionally, it was difficult to develop plant level structures that fostered dialogue between union members and managers as they were over ridden by national structures, although in larger plants a system of second tier bargaining did develop (Brosnan et al. 1990. Walsh 1989, pp 153-154. Britton et al. 1992, pp 71. Personal interviews).

Still these rigidities did not present too much of a burden to employers. The highly protected environment allowed most companies to pass the cost of any excessive wage claims directly on to the consumer and, as awards were generally set at the national level, to a substantial degree they removed wage formation from the calculus of intra-industry competition and so helped stabilise markets (Gould 1982, pp 227. Walsh 1989, pp 164. Britton et al. 1992, pp 79). Furthermore, the fact that awards were base line documents, and that up until the mid 1970s New Zealand had a very tight labour market, meant

that many workers actually received pay and conditions substantially above those stipulated in their award, thus employers did in fact have a substantial amount of leeway in the actual rates paid to workers (Brosnan et al. 1990, pp 33. Gould 1982, pp 119. Britton et al. 1992, pp 79).

By the 1970s the exhaustion of possibilities of the post-war mode of accumulation called into question the benefits of such a centralised, rigid, labour relations system. Both the state and many employers believed that to reinvigorate the New Zealand economy it was necessary to reorientate import substitution based industries towards the global economy (Franklin 1978, pp 221-227. Wooding 1987, pp 89-97). It followed that if previously protected industries were to be exposed to the vicissitudes of the world economy, it was also necessary to make New Zealand's system of labour relations more responsive to the economic realities being faced by specific industries and companies. This argument was reinforced by claims that the structure of wage relativities and demarcations that had become encrusted in the system made it difficult, if not impossible to introduce new technologies and work practices that would allow New Zealand companies to be internationally competitive (NZ Employers Federation 1978, pp 9-15. NZ Planning Council 1989, pp 83).[2]

Despite these claims few argued for a complete reversal of the system. Most employers recognised that centralised collective bargaining was not without its advantages (Walsh 1987, pp 164. NZ Employers Federation 1978, pp 16-20). Furthermore, employers generally recognised, as did the state, that a complete overhaul of the system was not politically feasible.[3] Still throughout the latter half of the 1970s and into the 1980s there were a number of efforts to modify the system and move the balance of power more decisively in capital's favour. Despite rising levels of unemployment the success of these efforts were mixed. Several key attempts by the state to directly confront (in support of specific employers) groups of workers ended

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2. It should be noted that many unions were by the early 1970s also dissatisfied with the industrial relations system. Their concern, however, was with the narrow definition of industrial matters defined within the Industrial Conciliation and Arbitration Act 1954 Act (as they were with the subsequent Industrial Relations Act (1972) (Howells 1974, pp 175).

3. It should also be noted that the continued existence of substantial border protection and other competitive controls throughout the 1970s meant that the centralised system of awards remained sustainable at the enterprise (if not at the macro-economic) level during this period. However, the system became increasingly unstable from the late 1960s onwards as central government tried on numerous occasions to force both employers and unions to adhere to wage guide lines which were compatible with government attempts to restore coherence to the accumulation regime (Boston 1987, pp 152-158).

in the state being forced to back down. In other areas it was more successful. As a whole, however, the reforms attempted lacked coherence, and increasingly the state, or perhaps more accurately in this case the government, resorted to the use of ministerial fiat to force both labour and employers into conforming with its aims. Finally, in June 1982, in an act of belligerence, and frustration, the government imposed a wage and price freeze in an attempt to force capital and labour to adhere to the wider reforms it was implementing (Brosnan et. al. 1990, pp 34-35. 168-169. Boston 1987, pp 157).

The wage freeze only put the question of labour relations reform on hold, however. The election of the Labour Government in 1984 and its lifting of the wage price freeze reopened the debate. Initially the new government, favouring its significant working-class constituency, restored the old system of labour relations - although there were number of significant modifications such as the introduction of voluntary arbitration (Brosnan et al. 1990, pp 35-36). This move contradicted the dominant direction of state sponsored reform. Spurred on by a powerful and well organised fraction of the ruling class, and a messianic belief by key groups within the state of the righteousness of their actions, the state assailed the New Zealand economy with a brutal mix of industrial and trade deregulation. New Zealand was going to have to get internationally competitive, and damn quick (see chapter three). In such an environment the rigidities of the centralised, collective bargaining system, would be intolerable.

This presented the Labour Government with a dilemma. It needed to substantially reform the structure of labour relations, whilst retaining the allegiance of its working class, and union supporters. The result was the 1987 Labour Relations act, which remained faithful to the concept of collective bargaining, whilst removing many of the rigidities that frustrated the ambitions of employers. There were four key areas of reform.

1. *Union membership became contestable.* In the past by registering with the Arbitration court a union was guaranteed the right to cover a particular section of workers (Walsh 1989, pp 152). The Labour Relations Act set up a number of mechanisms which made it possible for one union to challenge the jurisdiction of an other (Brosnan et. al. 1990, pp 36. 103. Easton 1987b, pp 202-203).
2. *Unions were given the responsibility to police awards.* Unions had to ensure that award conditions were not violated, and had the responsibility of bringing any suspected breaches to the labour court.

Previously the state had ensured compliance to awards. Although this would not necessarily significantly affect well organised unions with a strong sense of solidarity, for those workers who lacked solidarity, and to whom union coverage was a direct product of compulsory unionism, the removal of state monitoring significantly undermined their security (Walsh 1989, pp 152-153. Brosnan et. al. 1990, pp. 37).

3. *Second tier bargaining was banned.* Under the new act workers could only be covered by one agreement. Thus workers had three options. They could be covered by a national award; a stand alone agreement that is an enterprise agreement with a single union; or a composite agreement, that is an enterprise agreement involving several unions. Significantly, unions had to agree to cite an enterprise out of an award before a stand alone or composite agreement could be negotiated. Once out of the award, however, both the union and the employer had to consent to a return to a new award (Brosnan et al. 1990, pp 37. Personal documents).
4. *The areas opened to bargaining were widened.* Previously bargaining had been restricted to negotiating wages, conditions of work and hours, what the 1973 Industrial Relations act referred to as 'industrial matters'. The Labour Relations Act significantly increased the scope for negotiation. It was now possible for unions to become directly involved in such areas as technological change and so forth. Unions could thus, if they so desired, push for greater involvement in how an enterprise was managed (Boston 1987, pp 177-178).

Although the main aim of the Act was to encourage a devolution of bargaining down to the industry and enterprise level, and as such it can be seen as signalling a significant shift in the balance of power between employers and unions, the Act also opened up to unions a number of strategic options that had not previously been possible. Thus the Act set the stage for a period of labour relations reorganisation and experimentation.

Transcending Fordism - the options

The significance of the 1987 Act was appreciated by both Fisher and Paykel and a number of key unions involved with Fisher and Paykel. At the same time both the company and the unions recognised, if for different reasons, the inadequacies of the existing pattern of labour relations. As will be seen, this congruence of thinking led to the negotiation of a radical reformation of the labour relations system at Fisher and Paykel. However,

before delving into the happenings at Fisher and Paykel it is helpful to briefly step back and look at the range of options open to companies and unions involved in assembly line mass production who wish to transcend fordist labour relation norms.

In attempting such an outline there is a danger that the inappropriateness of any categories employed, based as they must be on past experience, will blind the analysis to the real nature of the transformations occurring. Given these dangers a measure of security can be achieved by restricting any typology to a relatively high level of abstraction, whilst at the same time allowing a degree of fluidity between the categories employed. Bearing these points in mind the following discussion will, following Leborgne and Lipietz (1988), explore the possibilities for on-site labour relations reform via two primary axes: the form of the labour contract, and the form of work organisation.[4]

With the development of micro-electronically controlled machinery the viable forms of labour contracts currently fall into two general categories, long-term and casual. With long-term contracts the relationship between the employer and employee is expected to stretch over a long period and is thus intense. In the case of casual contracts, on the other hand, the employment relationship is more distant, and thus more easily severed. This should not be taken to imply that groups of workers employed under casual contracts do not interact with an employer, or group of employers, over long periods of time. The significant point is that if an employer wished to break a relationship with a given worker he or she could do so at relatively little cost. In contrast employment contracts that are explicitly long term in nature can only be severed by the employer at a high cost; due to redundancy payments, loss of firm-specific skills and so forth. (Leborgne and Lipietz 1988, pp 268-269. Boyer 1988e, pp 225).[5]

On the work organisation axis there are three possible categories, deskilling, individualised involvement and collectivised involvement. Deskilling refers to strategies that are premised upon an increasing

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4. The relationship between the form of labour contract and the form of work organisation essentially as a step up in terms of abstraction from the initial argument of this chapter that labour relations rotates around the formation of a balance between coercion and consent.

5. A good example of casual employment contracts that generally involve a long term relationship between a relatively stable group of employees and an employer is the London dockers prior to the Second World War (See Marris 1986, pp 59-62). Whilst the sorts of relationships set out by Mitter (1986) in her study of immigrant women in the United Kingdom clothing industry provides a interesting contemporary example.

alienation of workers from the production process, that is a deepening of taylorist principles. The individualised and collective strategies run counter to the deskilling approach. Both involve the fostering of genuine worker participation in the management of the production process. This sort of worker participation should be interpreted as an opening of information channels censored under previous deskilling strategies. Whilst sharing a common aim the individualised approach differs from the collective approach in that it fosters a commonality of interests between workers and management by use of individual incentives, such as stable career path and bonus payments for increases in productivity. Collective approaches develop the commonality of interests via a partnership between management and the workers unions, that give workers significant control over on-site conditions, and a share of total productivity gains, in the expectation that a more cooperative environment will lead to greater quality and productivity gains (Leborgne and Lipietz 1988, pp 269. Amberg 1991, pp 71).

FIGURE 4.1. On-Site Labour Relations Possibilities

FORM OF LABOUR ORGANISATION	FORM OF LABOUR CONTRACT: Long Term	Casual
Deskilling	**A1**	**A2**
Individual	**B1**	**B2**
Collective	**C1**	**C2**

(Leborgne and Lipietz 1988, pp 268-271).

Combining the two axes, four primary *viable* combinations of organisational strategies can be derived (see figure 4.1). The A1 category represents the basic fordist pattern, whilst the B2 and C2 relations are self contradictory (at the shop-floor level at least). Thus for firms attempting to transcend the contradictions and limitations fordism there remain three options. The A2 case involves a continuation of fordist production norms with a movement towards casual employment contracts. As such, management uses new technologies to increase the division between conception and execution, whilst at the same time seeking to undermine the concessions workers have gained over past decades allowing it to freely and

cheaply vary the wage bill with fluctuations in demand (Leborgne and Lipietz 1988, pp 271-272. Aglietta 1987, pp 122-127).[6] It must be remembered, however, that this bifurcation of the work force necessitates a core of workers who control the production process whose employment relationship is very different from shop-floor workers. Indeed as these workers are the embodiment of the will of the company they in a sense employ themselves (Aglietta 1987, pp 126. Edwards 1979, pp 141-148). Thus this group of employees would likely continue with the B1 type employment relationships as they did under fordism, although in some areas there is likely to be a movement to B2 relationships as is typified by the increased used of outside consultants, and the contracting out of activities that previously had been handled internally. This strategy can be labelled neo-taylorist (Leborgne and Lipietz 1988, pp 271-272).[7]

The neo-taylorist strategy has several significant drawbacks, the most notable of which are the high capital costs of using micro electronics solely to increase the level of automation within a factory, and related to this, continued problems in monitoring and controlling the production process in real time (Leborgne and Lipietz 1988, pp 268-269. Holloway 1987, pp 145-151. Aglietta 1987, pp 125).[8] Although for simple processes these costs are easily off set by the gains from lower wages and increased wage bill flexibility, more complex processes necessitate, as was shown in the last chapter, a level of worker commitment and expertise that is contradictory to fordist control mechanisms. This sort of commitment can be achieved by either of two strategies. The first, the Californian model (named after the types of employment relationships pervasive throughout much of the Californian

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6. As the concern of this section is to explore how existing labour relations structures may be modified to improve the profitability of a production system an possibility of re-locating assembly operations to regions/countries with lower wage costs and more pliant labour with no major change in the technologies used will not be explored. This strategy has been used by a number of industries ranging from from relatively simple products such as apparel to more complex industries such as electronics and the automobile industry (see for example Massey 1979. 1984. Blueston and Harrison 1982. Martin and Rowthorn 1986 Dickens 1986. Sayer 1986b. Kelly 1986). It is important to note, however, that the threat of re-location (or the sub-contracting of process to a cheaper external supplier) is an important lever in achieving concessions from workers within an established plant.

7. The term neo-taylorist is used in preference to the commonly used neo-fordism (see Wood 1989) as by stripping away many of the gains labour had made in earlier decades neo-taylorism harks back to the sorts of labour relations structures which existed prior the fordist compromise.

8. It should be stressed at this point that such a 'pure' neo-fordist strategy is unlikely. However, the ability of companies which do not develop consensusal structures to use micro-electronically controlled machines within a production process in highly flexible manner will be limited.

electronics industry), involves a combination of B1 and B2 relationships. On the shop-floor commitment to the company is fostered through management directed team building, individually based incentives, and the implicit guarantee of a life-time job; all of which amounts to a whitening of traditional blue collar jobs. As with neo-fordism, managers will continue to be employed in B1 type relationships, although there will also be some movement within these groups to B2 patterns (Leborgne and Lipietz 1988, pp 272. Walton 1985. Altshuler et al. 1984, pp 205-207).[9]

The principle internal drawback of this approach is that it is premised upon a stable, long term, employer and employee relationship, and thus a rigid wage bill. Still, the costs of this wage bill rigidity should not be overstated. The necessary level of flexibility can be achieved by a number of offsetting strategies such as the limited use of temporary workers (that is the limited employment of workers in a A2 relationship), and the increased use of sub-contracting to reduce a firm's vulnerability to fluctuations in demand (Leborgne and Lipietz 1988, pp 270-271. Scott 1988a, pp 186-190. Altshuler et al. 1984, pp 205-206. Linge 1991b, pp 318). More significantly, it must be asked to what extent the establishment of the B1 relationship is possible in the face of worker resistance to the dissolution of collectivist institutions. Although high levels of unemployment and the threat of relocation or closure have generally undermined union organisation, many unions still maintain the leverage to insist on the maintenance of collective bargaining arrangements. Moreover, the continued existence of legislative structures which support collective bargaining arrangements may constrain attempts to move towards individual bargaining systems (Altshuler 1984, pp 276-286. Holmes 1987, pp 149).

The problem posed by organised labour can, however, be neatly sidestepped by the active inclusion of unions in the transformation of the work process. Which leads discussion to the second participatory based strategy: the Saturnian strategy, named after General Motor's attempt in the mid-1980s to transform its production systems at a new plant built in Tennesse (see Meyer 1986) (Leborgne and Lipietz 1988, pp 272). The Saturnian strategy is based upon a long term pact between the company and its workers, represented through their unions; that is a C1 type relationship. This pact is held together by expanding the area of commonality of interest between workers and management, extending the narrow fordist zone of

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9. Given the strong affinities of these sorts of relationships with Japanese practices this model could alternatively be described as the Japanese model.

complementarity to include areas such as work conditions and work organisation.[10] Obviously in so doing it presents a significant challenge - much greater than with the B1 relationship, to traditional management prerogatives. Indeed , the solidity of the pact will depend to a great extent upon management's willingness to accept the erosion of these prerogatives, as the more fully management embraces the partnership with the unions the more significant will its own organisational transformation have to be (Leborgne and Lipietz 1988, pp 269-271. Amberg 1991, pp 71-72).

In fact, the radical shift in the operational nature of on-site labour relations implied in the Saturian strategy is perhaps the greatest barrier to its introduction. If a company wishes to pursue such a strategy it may, in the short run, have to bear potentially costly limitations on its freedom of movement before any significant gains have been seen as a result of cooperation with labour (Boyer 1988f, pp 256-257. Klein 1989 , pp 66). Still it is important to recognise that the extent that a company will be constrained depends to a very large degree on the strategic possibilities that remain open to the union with whom the company is negotiating. The stronger the union's position, the more sincere will the company's intent need to be (Holmes 1987, pp 149. Altshuler 1984, pp 276-281. Amberg 1991. Foster and Woolfson 1989).

Towards Worker Self Management - Fisher and Paykel[11]

Throughout the 1970s and up to the mid 1980s there was little that was remarkable about Fisher and Paykel's labour relations regime. The company had introduced a number of innovations that encouraged worker participation such as a profit sharing scheme, and a worker share ownership plan, and real efforts were made to ensure that workers

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10. It should be noted that there is large degree of over-lap between the B1 and C1 relations. For example in Japanese automobile industry the use of individual incentives are used in concert with union involvement (Cusmanos 1985). Similarly the Nissan assembly plant opened at Sunderland in 1986 couples a on site union (chosen by Nissan) with extensive use of individual based incentives (Holloway 1987). In both cases, however, the extent of direct union influence in shop-floor level structures is largely cosmetic.

11. The following discussion does not deal directly with Fisher and Paykel's Australian factory. However, the structures the company is developing in its Australian plant are similar to those being developed in New Zealand (the company is after all using the same - internally designed and produced - production systems as it is in New Zealand). The most obvious difference between the two countries is that in Australia Fisher and Paykel has a single site agreement with the Australian Metal Workers Union, whilst in New Zealand it has a composite agreement which includes several unions. Additionally, the agreement which covers the Australian factory is linked to a national award, whilst the New Zealand one is not (Personal interviews).

understood where the company was going. The company also had a reputation for working well with unions, having successfully negotiated second tier agreements since the late 1970s. These factors aside, there was little that could be said about Fisher and Paykel's labour relations that could not be said about many other large manufacturing companies (Personal interviews. Radio New Zealand 1991).

Although Fisher and Paykel's on-site labour relations were healthy, the company was frequently affected by industrial action in defence of national award claims. The resulting losses from these actions were substantial. For example in the 1987-88 award round, water front strikes and strikes by company electricians and drivers cost the company an estimated five million dollars. Furthermore, the unpredictability of these stoppages undermined the integrity of the production and inventory control systems the company was developing (see chapter three). Given these high costs the company was keen to gain greater control over its industrial bargaining. To this aim Fisher and Paykel set about negotiating a composite agreement for its various unionised workers (Radio New Zealand 1991. Personal Interviews).

Greater control over industrial bargaining was, however, only part of the motivation behind Fisher and Paykel's push for a composite agreement. The company recognised that the new production systems it was developing required the establishment of radically new on-site labour relations structures. Just-in-time production systems require a level of cooperation between management and labour that was alien to the company's existing structures. The company also realised that to establish new, more consensually based structures would necessitate the development of a much closer relationship with the unions who represented their workers. Given the widening of the bargaining scope provided for in the Labour Relations Act a composite agreement offered a useful foundation upon which to start building such relationships. Still it takes two to tango, and without the acquiescence of the unions there was little Fisher and Paykel could do (Personal interviews. Radio New Zealand 1991. Sunday Star 1991, August 4, pp D3-D4).

The primary on-site union within Fisher and Paykel was the Engineers. The Engineers Union was alert to the fact that developments over the past decade necessitated a fundamental shift from traditional patterns of labour relations, as a consequence it was committed to moving away from occupational awards towards industry-based awards that were sensitive to the competitive pressures faced by the industry. The union also had a more

radical, long term agenda. Many of the new technologies being introduced, the Union believed, suggested far-reaching possibilities for more secure, inclusive, and fulfilling jobs. It was also recognised by the union that these possibilities were only likely to be realised if efforts were made to foster supportive labour relation mechanisms. Thus the Engineers Union saw itself at the threshold of a new era of labour relations and was keen to accommodate employers who thought likewise (Personal interviews. Personal documents. National Business Review 1987, May 1, pp 1. Jones 1988. NZ Engineers Union 1991. Radio New Zealand 1991. Dominion 1991, August 14. Williams et al. 1991).[12]

Fisher and Paykel began canvassing the relevant unions about the possibility of negotiating a composite agreement in mid 1988. By the beginning of 1989 all the relevant unions - there were 13 in all (see table 4.1) - had agreed to cite Fisher and Paykel out of the national awards system. Therein followed an intense and a lengthy period of negotiation. For the negotiations to be successful it was necessary for the unions and company to redefine their attitudes to each other. Confrontation and distrust had to be replaced by cooperation and mutual respect if the composite was to be successful. Furthermore, as the unions did not have a history of working together they also needed time to develop lines of communication and trust between themselves so that they formed a coherent negotiating bloc (Personal interviews. Radio New Zealand. 1991).

Table. 4.1. Unions Involved in the Composite Negotiations

Engineers Union (with about 80 percent of the unionised workers)	
Electrical Union	Painters Union
2 Clerical Unions	Carpenters Union
3 Unions covering Stores and Drivers	Bakers Union
Labourers Union	Service Workers Union
Nurses Union	

(Source: Personal documents).

Thus it was not until April 1991, over two years after the idea of a composite was first canvassed, that the composite agreement was registered (Personal interviews). The registered document was notable for the agreements reached in two areas; skill development and career paths, and

12. The Engineers Union's commitment to industry and enterprise bargaining, and a more consensual and cooperative approach to bargaining were set out in the Heads of Agreement to the 1987 New Zealand Metal Trades Award (NZ Arbitration Court 1987, pp 13 686-13 687).

the introduction of formal mechanisms in which to include workers in decision making processes.

Worker Involvement in the Management Process. As has already been stressed the key concept of the composite negotiations was the attempt to develop a sense of cooperation between Fisher and Paykel and, through the collective unions, its workers. Indeed, much of the agreement does not set out explicit rules to which workers and management must adhere. Instead the agreement sets out mechanisms which workers and management at the contested site must work through to come to agreement on disputed areas. Thus the composite sets out a number of areas where management and workers must 'agree to agree'. Examples of these 'agreement to agree' clauses include; work changes, hours of work, contract work, temporary employment, and health and safety. While it is not possible to outline the specific avenues set out in the agreement it is possible to outline the key forums upon which communication is focused (Personal interviews. Personal documents. Radio New Zealand 1991).

At the company level there is an over-arching consultative committee consisting of representatives of management and union delegates from each division. This committee meets every six months, or more frequently if circumstances require, to discuss matters that concern the whole enterprise, such as the state of the economy, how the company is performing, and any proposed major changes that affect workers. It is also the forum through which wage negotiations are conducted. Beneath this, there are joint management and union divisional committees that meet to discuss any relevant issues that have arisen. The composite also provides for informal discussion between relevant managers and workers in any given case, and the establishment of joint working parties to examine specific areas of concern (Personal interviews. Personal documents. Radio New Zealand 1991). For example in late 1991 the demand for the company's chest freezers (largely due to the growth of sales to Japan) was outstripping the capacity of the company's chest freezer line, necessitating the need for extensive over time. The payment of overtime combined with the uncertainties of scheduling for overtime, however, undermined profitability of this extra business. Hence the company and the unions came to an agreement by which workers would work a 40 hour four day week, eliminating the need for overtime, whilst giving workers an extra day off a week (Personal interviews).

In a couple of cases - leave, and health and safety - the principle of 'agreement to agree' has been developed into formal on-site committees that formally involve delegates in the day to day running of the plant. In the area of health and safety joint union management on-site committees that meet regularly have been established. The case of leave involves a more radical change with union delegates becoming actively involved in the granting of leave and the disciplining of those who abuse the system. The biggest change is in the area of sick leave. In place of the old provisions, where workers were entitled to five to ten days of sick leave a year, the composite agreement allows unlimited leave for those who are genuinely ill, or who need time off work for other valid reasons. The monitoring of this system is done through plant level attendance committees that involve both union delegates and management. Attendance committees have power to grant or decline sick leave, as well as other forms of leave, and the power to discipline those workers who abuse the system. (Personal interviews. Personal documents. Radio New Zealand 1991)

Career Paths and Skill Development. Prior to the composite agreement throughout Fisher and Paykel's ten operating divisions there was a complex pay and skill structure; in all over 2,000 pay rates were possible. In part these reflected objectively set skill levels and in part historically established norms and relativities. Management did, however, have a significant degree of discretion in the setting of pay rates, most notably through a four step merit system that was awarded at the discretion of management. Under the composite this structure has been replaced by an objective, skilled based system (Personal interviews. Personal documents. Radio New Zealand 1991).

The development of this rationalised, objective pay and career structure was one of the key objects of the unions when they entered into the composite negotiations. One of the unions' primary concerns was to up-skill their less skilled members and thus improve their job security. Furthermore, the unions were also keen to see the establishment of clear career paths through which their members could move. The composite agreement established three skill and pay categories; production and related activities (this includes drivers, stores, cleaners and security); trades and technical; and clerical workers. Both the production and clerical scales have five skill levels, whilst the trades and technical scale has six. For a worker to move up a level, and as a result be entitled to a higher wage rate, he/she must show that he/she is competent at the functions that have been defined

as necessary for that skill level, this is done by obtaining points for learning and obtaining competency in these functions.[13] Movement up the skill levels is thus entirely objective, shop-floor management has no say over whether a worker will move up to a higher skill level. Running parallel to these skill structures the company and unions have also been developing on-site training programmes which facilitate workers movement through these scales (Personal interviews. Personal documents. Radio New Zealand 1991).

The establishment of the this wage rate system faced two main obstacles. It was necessary to persuade management that the advantages of such a system outweighed the loss of management's traditional prerogatives in setting individual pay rates. Given upper management's commitment to genuine cooperation with unions, and up-skilling this did not pose too much of a barrier, although there was substantial resistance from lower level managers to whom power over the establishment of pay rates was of central importance. The second obstacle was perhaps more critical. The development of a uniform pay and skill system challenged the position of those groups of workers who already had well established skill and payment scales. In setting up a uniform system across Fisher and Paykel it was necessary to question the rationale behind these scales, and not infrequently it was found that traditional patterns and relativities had been superseded by recent developments. Thus for the composite to be successful several groups with significant bargaining power under the old award system had to surrender that power for the greater collective good. Such groups would only do so if they could be assured that in the long term they would be better off under the composite system than if they had pursued a more individualistic strategy. In most cases the demands of these workers have been reconciled with those of the wider collective. Although the establishment of skill norms across the trades and technical employees has met with a great deal of difficulty (Personal interviews. Radio New Zealand 1991. Sunday Star 1991, August 4, pp D3-D4).

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13. The points system is based upon the average time taken to learn and gain competence in a given function. Thus the basic points system is:

Points	Time to Learn	Time to Achieve competency
1	minutes to	hours (less than 8 hours)
3	hours to	days (less than 24 hours)
5	days to	1 week (less than 40 hours)
10	week to	weeks (less than 80 hours)

For each scale there is a given number of points that a worker must obtain to move on to the next level (Source: Personal Interview).

It is not difficult to recognise how the changes instigated under the composite complement the flexible manufacturing systems being developed at Fisher and Paykel described in the previous chapter. It is more difficult to see the overall trajectory of the developments in technology and labour relations at Fisher and Paykel. Management sees a logical movement towards what they refer to as worker self management; that is a situation where workers are capable of seeing and doing what needs to be done without supervision. Indeed they go a step further and suggest that this sort of production system will in time completely erode the cleavage between workers and managers. All will manage, just as all will work.[14] This is not a representation that can be easily dismissed, and if accepted suggests that New Zealand may be moving into a radically new socio-economic era not unlike that outlined by Halal (1986) and other post-industrial theorists (see Drucker 1989. Toffler 1980). Given the significance of this claim it is necessary to ask to what extent is the concept of self-management a true representation of what is happening.

Self-Management - What does it mean, and how far can it go?

It would be foolish to deny the significance of the shifts that have occurred at Fisher and Paykel. At the same time, however, it is dangerous to draw too many conclusions from Fisher and Paykel's experiences. There are two main reasons for this caution. At least in the immediate future it is doubtful whether inclusive, consensus based labour relations regimes will in any sense become dominant within New Zealand enterprises. And secondly it is necessary to question how the imperatives which are driving Fisher and Paykel towards a more consensus based labour relations regime mesh with the concept of self management.

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[14].It is interesting to note that the concept of self-management, parallels the types of production systems that have been outlined by many marxist writers as typifying a truly socialist labour process. Take Braverman for example:

> ... An automatic system of machinery opens up the possibility of the true control over a highly productive factory by a relatively small corps of workers, providing these workers attain the level of mastery over the machinery offered by engineering knowledge, and providing they share out amongst themselves the routines of the operation, from the most technologically advanced to the most routine (Braverman 1974, pp 230).

Braverman's vision sounds remarkably like that held by managers at Fisher and Paykel. Yet for Braverman the notion that capitalist labour processes would converge toward socialists would have been preposterous.

1. *The significance of inclusive consensus based labour relations regimes.* The consensually based labour relations structures being developed at Fisher and Paykel represent but one, and by no means the predominant one, of a number of avenues through which on-site labour relations may be redrawn. Indeed whilst in the long term consensus based on-site labour relations regimes may offer significant advantages over more coercive strategies, the high costs of establishing such regimes, combined with the current weakness of the labour movement, make more coercive strategies (such as A2 forms of labour relations contracts, or perhaps in some cases B2 contracts) more immediately attractive (see for example Dominion 1991, November 28, pp 6. Britton et al. 1992, pp 81-88). Moreover, whilst the 1987 Labour Relations Act supported the continued involvement of trade unions in the reshaping of on-site labour relation regimes, the Employment Contracts Act passed by the National Government in early 1991 strips unions of any special legal rights to bargain for groups of workers. By so doing the Act not only undermines the ability of companies and unions to hold together comprehensive on-site collective agreements, but at the same time facilitates the use of more exclusive, coercive labour relations strategies (Anderson 1991. Walsh 1991. Fisher and Paykel 1991a. NZ Engineers Union 1991. NZ Council of Trade Unions 1991. Britton et al. 1992, pp 88-89. Personal interviews). This is not to say that consensus based on-site labour relations regimes such as those at Fisher and Paykel will necessarily remain a peripheral part of New Zealand's labour relations. Rather it is to suggest that given the current plurality of options open to employers (and in some cases employees) it would be foolish to second guess future developments within the labour relations field.

2. *Worker self management and managerial control.* As has been shown Fisher and Paykel's motivation to develop inclusive, consensus based labour relations structures is driven by the need to mobilise its shop-floor workers in real time, and to alter employment conditions (work hours and such forth) in response to shifts within the company's markets. To achieve these goals the company has, through the composite agreement, redrawn the frontier of compromise between managers and workers. Whilst workers on the shop-floor (or groups of workers) are given responsibility for the processes which they

operate, the basic fact that workers are subservient to the rhythms of the line remains. This is not to deny that the degree of autonomy of individual workers may (although they also may not) be increased under such work processes. Rather it is to stress that the degree of autonomy of each worker must, if the integrity of the system as a whole is to be respected, be tightly defined.[15] Similarly, whilst workers are encouraged to seek methods of improving the efficiency of the processes for which they are responsible, given the high level of integration between each process any modification of one process must be coordinated by those who have an intimate understanding of the production system as a whole (see for example Klien 1989). Thus management, via its ability to define the overall parameters of the system, in a very real sense retains a high degree of control over the work patterns of each worker within the system. In return for workers respecting the imperatives within Fisher and Paykel's production systems, however, the company guarantees security of employment, a share in the profits which accrue from this cooperation, and a voice in any major changes which may affect workers.

Thus whilst Fisher and Paykel's current labour relations reforms may be more humane, more democratic, they are still defined by the logic of the capitalist nexus within which they are constituted.

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15. Certainly the level of autonomy does not appear (although they may do at a latter stage) to suggest the return to an industrial yeoman's democracy as has been claimed (albeit in a slightly different context) by writers such as Piore and Sabel (1984, pp 261). Indeed the forms of labour organisation compatible with just-in-time manufacturing systems bear no resemblance to the work rhythms adhered to by many industrial workers prior to the industrial revolution (and in some cases prior to spread of taylorist doctrines) (Thompson 1967. Pred. 1981 Edwards 1979. Braverman 1974).

CHAPTER FIVE
Flexibility and All That - An Attempt at a Conclusion

"Smartass youth: Aw, I did all them old-fashioned dances, I did the 'Charleston,' a-and the 'Big Apple,' too!
Old veteran hoofer: Bet you never did the 'Kenosha,' kid!
(Thomas Pynchon).

The past two chapters have made much of the flexibility within Fisher and Paykel's (and to much lesser degree Simpson's) current production systems. As has been seen, this emphasis is a reflection of both the competitive advantages a high level of flexibility offers to Fisher and Paykel, and the need for such flexibility to survive within the economic milieu within which the company is now operating. At the enterprise scale flexibility has a number of specific meanings relating to volume, product, shop-floor labour and so forth. Yet over the past decade, within New Zealand and internationally, at the enterprise and state level, the concept of flexibility has taken on a more general (indeed almost metaphysical) meaning (James 1986. Jesson 1987. NZ Planning Council 1989. NZ Council of Trade Unions 1991. Boyer 1988e. 1988f. Lash and Urry 1987. Jessop et al. 1987. 1990). This more general meaning is based on the creation of a polarity between flexibility, which suggests highly sensitive and fast moving structures, and rigidity, which implies insensitive, arthritic structures. Given this polarity, flexibility is by definition highly desirable whilst rigidities, such as they are, are viewed as worse than the devil himself. Put in such simple terms this dichotomy seems quite logical. Still a little thought suggests that something is a awry. If flexibility is of such importance why does the position of the New Zealand economy, and indeed much of the global economy, appear so precarious? If flexibility is so inherently good why did it take until the 1980s for this to be recognised? If the effects of high levels of flexibility are so beneficent, why are so many of the measures which have been introduced to achieve it so vigorously opposed by some sections of the community?

These are all very big questions, and to attempt answer them in depth would take the discussion out of the purview of the current study.

Still by approaching these questions within the context of the discussion of the previous chapters, it is possible to glean some sense of the proper meaning of the current flexibility fetish, whilst at the same time gaining a better insight into the dynamics behind the strategies being pursued by both Fisher and Paykel and Simpson (NZ).

Flexibility and Institutional Reform

As has been discussed (see in particular pp. 54-55), the unifying theme of the state sponsored institutional reforms since 1984 has been the wholesale removal of the barriers which the existing institutional framework placed upon the search for alternative accumulation strategies to those pursued in earlier years. The corporatisation and privatisation of state enterprises, the lowering of both personal and corporate tax rates, the deregulation of financial markets, the removal of import licensing and the lowering of tariffs, labour market reform and a myriad of other reforms each have this goal as their underlying objective. At the heart of these reforms is a deeply held belief - shared by much of the corporate community, several key departments within the state policy network, and a significant proportion of the managerial and professional middle classes - in the ability of unrestrained market competition to foster the development of a coherent, prosperous, and dynamic mode of growth. Or to put it more bluntly, by giving capital (both local and international) a carte-blanche to do as it will, it is believed that economic prosperity and stability will be restored (at least for a large enough portion within society to create a stable political power bloc).

This belief, of course, is not unique to New Zealand, indeed its supporting theories have been imported from right wing American and English intellectual circles (Jesson 1988). What is most notable about the current resurgence of these doctrines is the remarkable grasp over policy debate and formulation they have managed to obtain over the past eight years. Whilst the past decade or so has seen a universal shift throughout the advanced industrial countries towards market competition, New Zealand has gone further than most (perhaps any) countries in pursuing the ideal of an economy régulated by unmediated competitive pressures.

Paradoxically the strength of this movement within New Zealand does not in itself reflect either the success of the reforms it has inspired, nor any majority acceptance of worth of these reforms. Indeed the failures (or setbacks depending on one's point of view) of these reforms have at

times been dramatic. The property, and corporate take-over booms which followed the deregulation of financial markets in the mid-1980s led to a number of spectacular company collapses in the late 1980s. The lowering of border protection, combined with high real interest rates has decimated the manufacturing sector and attempts to reform social welfare, most notably the superannuation reforms in the 1991 budget, have led to a number of humiliating policy back-downs (Britton et al. 1992. Jesson 1989. NZ Department of Statistics).[1] Rather, to a very large degree, the strength of the reform movement is derived from the conceptual dichotomy it has created vis-a-vis the pre-1984 situation, and the fact that the suggestion of this dichotomy strikes a deep chord with a significant portion of the electorate.[2] That is to say the momentum of the reforms is driven by a dissatisfaction with the post-war régulatory matrix, (never mind that many of those who were so keen to escape the restrictions of the existing institutional matrix were those who had benefitted most from the protections afforded by it), and as such is based upon a crude opposition between the supposed inefficiency of direct state economic intervention, and the efficiency of market competition. And this raises the question as to the validity of such a simple, and wholesale, rejection of state involvement.

The post-1984 structural reforms have facilitated, even forced, a diverse, and complex series of experiments within the business community for new ways to turn a profit. The property and take-over booms and busts, and the large numbers of bankruptcies are, if nothing else, a testament to this. What is largely missing from the reforms so far pursued, however, is a coherent set of broader supporting structures which mesh with the enterprise level strategies which the restructuring (for want of a better word) has engendered (Crocombe 1991, pp 154-155. 165-177). Indeed it is arguable that much of flexibility within local companies is not a positive product of the post-1984 reforms, but rather a defensive posture which they have been forced to adopt to survive within what is in many respects a highly incoherent and hence unpredictable economic milieu. And that the strategies they are using to obtain the flexibilities necessary for survival within such an environment, are in many respects incompatible with long term locally oriented growth (Britton et al. 1992. Boyer 1988e).

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1. Since 1984, employment in the manufacturing sector has fallen by well over 60,000 (NZ Department of Statistics).

2. That is to say that there is a significant number, perhaps up to two thirds of the electorate, who are willing to tolerate the thrust (if not the entire substance) of the reforms, if not support them outright.

Flexibility and the Individual Enterprise

Whilst the preceding discussion has not painted a particularly optimistic picture of the prospects of the post-1984 set of institutional reforms creating a stable, prosperous economy, this should not be taken to mean that there are not areas within which the New Zealand companies are likely to do very well - as has been seen in the discussion in chapters three and four on Fisher and Paykel. What is interesting about Fisher and Paykel, however, is not so much how it has responded to the possibilities created by the economic reforms, but how it has managed to survive and expand despite the inchoate impact of these reforms. High interest and exchange rates, hostile legislative changes (such as the changes to the Commerce Act which precipitated Email's challenge to Fisher and Paykel's exclusive dealing system and the Employment Contracts Act), and the large and unpredictable swings in demand that have characterised the post-1984 economic environment have undermined the company's ability to remain faithful to its investment-intensive long-term development plan. Reflecting this, a recurring theme within newspaper reports on Fisher and Paykel throughout the latter half of the 1980s is the threat of relocating its operations offshore in response to the hostile New Zealand economic environment (NZ Herald. National Business Review). That said, a number of points about how Fisher and Paykel has managed to remain within New Zealand bear both repeating and a little elaboration.

1. *Technological Dynamism.* The success of Fisher and Paykel has centred upon the development of technologically innovative production processes and products. To achieve this the company has self-consciously built up a broad range of technical expertise within the company, rather than relying heavily upon outside suppliers and consultants. The reasons behind this strategy are simple. By maintaining a broad range of expertise within the company, Fisher and Paykel is able to rapidly evaluate and respond to the possibilities offered by technologies which at first glance might seem to have no application within the whiteware industry. Moreover, keeping the research and development process in house also creates continuity within the company's research and development programmes.

This is not to deny the importance Fisher and Paykel's links with external suppliers and consultants. Certainly, the ability of Fisher and

Paykel to continually improve both its processes and products is dependent upon its links with a wide range of companies. Fisher and Paykel's liaison with General Electric in the development of the motor technology for its electronic washing machine, is one of the more obvious examples of these linkages. In a number of other areas the nature of Fisher and Paykel's interaction is less reflexive. For example a number of the more interesting innovations within Fisher and Paykel's stove and cooktop product line, such as halogen elements, have involved incorporating technologies which have been developed to a high degree by overseas companies into its own product range. This may seem to contradict the argument of the preceding paragraph. It does not; the central point is that the broad level of technical expertise within Fisher and Paykel allows it to exploit the possibilities presented by international innovations, whilst maintaining the integrity of its own product and process philosophies.

2. *Rapid Information and Material Flows.* Another dimension which is central to Fisher and Paykel's corporate strategy has been the development of a range of innovations to increase its responsiveness to both fluctuations in established markets and new marketing possibilities. Parallel to this the company has engaged in an extensive programme to reduce to a minimum the amount of slack within its production and marketing systems. As chapter three has discussed this has led to the development a complex set of organisational structures, which provide the stability necessary for Fisher and Paykel to respond efficiently and rapidly to any shifts within markets. A central dimension of this reorganisation has been the reorientation of its relations with both its suppliers and distributors/retailers so that they are compatible with Fisher and Paykel's internal strategies.

This raises the question of the geographic impact of these shifts in Fisher and Paykel's external linkages. It is frequently argued that production strategies such as those being pursued by Fisher and Paykel (and Simpson (NZ)) require a major transformation of the spatial scope of the linkages with suppliers of the company implementing them, encouraging local over more dispersed linkages (Sheard 1983. Moulaert and Swyngedouw 1989. Linge 1991b. Schoenberger 1988. 1989). In many cases it may do; however in the case of Fisher and Paykel it is unlikely to. Certainly the high level of inter-firm interaction necessary for just-in-time manufacturing systems favour, all other things being equal, spatial

agglomeration. However, locally based component suppliers have tended historically to be clustered around (or at least been in the same region as) whitegoods assembly plants anyway, and so the introduction of just-in-time delivery schedules only increases the intimacy of the linkages between Fisher and Paykel and its suppliers.[3] Moreover, New Zealand lacks the industrial depth to produce many of the materials and components used by Fisher and Paykel. Thus a significant proportion of the company's materials and components must, of necessity, be imported.

3. *Shop-Floor Commitment and Flexibility.* Chapters three and four both stressed the importance of establishing and maintaining high levels of shop-floor commitment. This creates a high level of co-dependency in the relationship between workers and management. On the one hand, Fisher and Paykel is committed to a long-term relationship with its workers (except for those temporary workers it must employ to cope with large swings in demand), and hence in the short to medium term is tightly tied to a particular locale. On the other hand the position of its workers are tightly tied to the success or otherwise of Fisher and Paykel, a dependency which is heightened by the fact that the skills obtained by workers are firm specific and thus to a significant degree non-transferable, and that for many workers those skills which are transferable will not be translated into a widely recognised qualification.[4] Indeed given the absence of a widely supported and well funded independent skills certification authority, and that many companies are pursuing less inclusive shop-floor reform strategies, there is the very real possibility that Fisher and Paykel could become something of a skills ghetto.

That said, the balance of power between Fisher and Paykel and its employees (all else being equal) will shift through time as the company establishes a larger portion of its manufacturing facilities in Australia. As with its New Zealand operations any such facilities will be based upon an intimate and long term relationship between it and its shop-floor workers, (as can be seen in its approach to the workers in its Queensland

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3. An example of how just-in-time linkages may successfully spread over relatively large distances is provided by Fisher and Paykel's Range and Dishwasher division (located in Dunedin), which receives a daily delivery of fiberglass, and cardboard packaging from two Christchurch companies (Personal interviews).

4. The Engineers Union is keen to integrate Fisher and Paykel's internal training system, and pay scales with scale system being developed By the [New Zealand Educational Authority]. This organisation, however, lacks both funding and wide spread industry support for its objectives (Personal interviews).

refrigerator factory). However, the establishment of a multi-national production network will give Fisher and Paykel the opportunity to play off New Zealand workers against Australian workers.

Although Fisher and Paykel is competing within increasingly diverse and fast changing markets, its ability to survive within such an environment has been dependent upon its capacity to create a set of long term relationships which as a whole allow the company to achieve a high level of market flexibility. Similarly, in a more precarious manner, and on a smaller scale, Simpson (NZ) is attempting to develop, within the context of its ownership by a large foreign whitegoods manufacturer, a set of structures which will allow it to obtain flexibilities similar to those achieved by Fisher and Paykel.

As such, Fisher and Paykel and Simpson's production and marketing systems can be viewed as islands of dynamic stability within a broader milieu of flux and uncertainty. It would be misleading, however, to view the chaos and confusion that has characterised the New Zealand economy since 1984 as signalling a movement towards a structureless. Certainly, in many respects the New Zealand economy is less structured than in prior years. Yet this lack of structure reflects not a solution to the economic crises endemic since the mid-1970s, but rather the varied and contested nature of the solutions being tried at both the state and enterprise level to overcome these crises.

Appendix 2.1. The Structure of the Post-War Economy

The Economic Structure - 1959-1960

To get a better sense of the dynamics of the post-war mode of development it is useful to set out in little more detail, and define a little less ambiguously, the structure of the post war economy. Fortunately, Franklin (1978), using inter-industry tables for the year 1959-1960, has already done so.

The economy can be divided into four basic sectors; the export orientated sector (EXO), the import dependent sector (IMD), the urban based service sector (UBS), and the local resource based sector (LRB). Activities within each of these sectors then be divided into four more categories based upon the nature of their links with other industries; that is forward linking, backward linking, forward and backward linking, and final demand. Bringing these two groups of categories together the economy can be described in table form (see Table 2.1.1). As the main text has described this structure and the dynamics of its development it is not necessary to describe this table in detail. It is important to stress however, that table 2.2.1 represents a 'snap shot' of the economy at a fixed point in time, as such it does not give a sense of the fluidity, or otherwise, of this structure through time. Indeed if this is forgotten the table can be somewhat misleading. For example, although vehicle assembly's linkages are defined as fitting within the final demand category, in subsequent years, encouraged by state initiatives, it did develop significant backward linkages.

Employment Growth by Sector - 1936-1971

As well as using the categories of IMD, EXO, UDS and LRB to describe the structure of the economy Franklin has also calculated the level of employment growth within each of these sectors (see table 2.1.2). As can readily be seen these figures support the tenor of the argument in the main text.

Although in his study Franklin goes back to 1891 the table presented here is only for the period from 1936 to 1971. The 1891 figures have not been presented because it was felt that it was dangerous to define industries in 1891 in terms of categories established to define the post-war economy. Specifically the IMD sector in say 1960 can not be equated one for one with those industries at the turn of the century who were involved in activities

with a significant import content simply because at the turn of the century they lacked the sorts of protections afforded to industry in 1960. Obviously mixing Blyth's categories with Franklin's in the main text introduces something of a conceptual discontinuity into the analysis, this is unfortunate, but given the time constraints faced by the author, and the fact that the trends for the period 1891-1936 suggested by Franklin's analysis are similar to that of Blyth's (1974), this discontinuity is not of vital importance.

Table. 2.1.1 The Structure of the New Zealand Economy

	Export Orientated Sector	Import Dependent Sector	Urban Based Service Sector	Local Resource based Sector
Final Demand		Tobacco and Cigarettes	Services	Beverages
			Trade	Hunting and fishing
		***Vehicle assembly		
		**Clothing and piece goods		
		*Miscellaneous manufacturing		
		5.7	**153.4**	**7.2**
Backward Linkage	Dairy products	*Furniture and fittings	Residential building	Footwear - not rubber
	Fruit and vegetable preserving	*Other food products	Commercial building	
	Meat	**Electrical products	**Air transport	
		**Textiles		
	448.3	**17.9**	**10.0**	**0.2**
Forward and Backward Linkage	*Paper products	**Machinery	Other construction	*Leather products
		**Other chemical products	Electricity and gas	*Wool textiles
		**Metal products		*Non-metallic mineral products
				Wood products
	33.6	**51.0**	**29.0**	**23.2**

continued over page

Table 2.1.1. continued.

	Export Orientated Sector	Import Dependent Sector	Urban Based Service Sector	Local Resource based Sector
Forward Linkage	Farming Forestry ***Chemical fertilisers	**Rubber products	Banking and insurance *Communication Water and sanitation Printing Road, rail, shipping *Other transportable products Trade	Mining and quarrying
	709.2	**5.4**	**164.9**	**4.5**
	-----	---	-----	---
	1191.1	**80.0**	**357.3**	**35.1**

Imports including capital inputs as percentage of total output: * 10-24, ** 25-49, *** over 50.
Bold numbers refer to ultimate disposal of exports 1965-66 ($ millions)

(Source: From Franklin 1978, pp 47).

Table. 2.1.2. Employment by Sector 1936-71[1]

	EXO	IMD	UBS	LRB	Unassigned
1936 (000s)	165.2	67.6	347.6	36.6	DNA*
1971 (000s)	176.8	157.8	712.8	58.2	13.8
Percentage increase 1936-1971	7	133	106	59	

*Data Not Available, see footnote.

(Source: from Franklin 1978, pp 51).

1. Franklin only gives absolute figures for 1891 and 1971. Hence the 1936 figures quoted were obtained by using the percentage figures for expansion between 1891-1936, and 1936-71 to extrapolate the 1936 figures. The mid-point of the two estimates has been used to lessen the likelihood of any rounding errors. As Franklin gives no percentage increase for the unassigned category it was not possible to calculate a 1936 figure for this category.

Appendix 2.2.

Table 2.2.1. New Zealand Whitegoods Manufacturers - December 1956

Company	Ownership#	Whitegood Products	Other Manufacturing Activities
Chas. Begg and Co Ltd (Wellington)		Refrigerators	
Bradley's Electrical Co Ltd (Wellington)	Private company, capital 10,000 pounds	Refrigerators, clothes dryers	Ironing machines, fish fryers, wire wound resisters, transformers
Norman Bullock Ltd (Lower hutt)		Refrigerators, clothes dryers	
N. R. Cunningham Ltd (Masterton)	Private company, capital 60,000 pounds	Refrigertors and cabinets	
Dishmaster Appliances Ltd (Petone)	Private company	washing machines, clothes dryers, dishwashers	Waste disposal units, fin type air heaters
Dominion Motors Ltd (Wellington)		Washing machines	
Eden Manufacturing Co Ltd (Auckland)	Private company, capital 5,000 pounds	Refrigerators and cabinets	
Electrolux Ltd (Wellington)	Wholly owned subsidiary of A. B. Electrolux, Stockholm	Refrigerators	Vacuum cleaners
D. J. Eyre and Co Ltd (Auckland)		Refrigerators	
Fisher and Paykel Ltd (Auckland)	Private company, capital 400,000 pounds	Washing machines, refrigerators, clothes dryers	Roto-chef
General Motors NZ Ltd (Petone)	Wholly owned subsidiary of General Motors Corporation	Refrigerators, ranges	Motor vehicle assembly, mufflers
His Master's Voice Ltd (Wellington)		Refrigerators	Radios, records*
Home Appliances Ltd (Auckland)	Private company, capital 11,000 pounds	Washing machines	

Kent English Co Ltd (Auckland)	Private company, capital 2,700 pounds	Refrigerators	Radiators, oil filled heaters, oil burning heaters
McAlpine Refrigeration Ltd (Auckland)		Refrigerators	Commercial refrigerators
Mason and Porter Ltd (Auckland)	Private company, capital 131,760 pounds	refrigerators, clothes dryers (some components only)	Lawnmowers, agriculture and dairying equipment
Mooar and Stanley (Stanmor) Ltd (Christchurch)	Private company, capital 3,500 pounds	Clothes dryers	Radiators, elements, fan heaters, washtub cabinets, kiddy carriers
Morris Products Ltd (Christchurch)		Clothes dryers	Jugs, raqdiators, general metal work
National Electrical and Engineering Co Ltd (Wellington)	Public Company, capital 118,270 pounds	Ranges	Irons, toasters, radiators, boiler grinders, gas ranges, enamelled signs, refectors etc...
Osborne Gas Stove Co Ltd (Christchurch)	Wholly owned subsidiary of Turnbull and Jones Ltd	Washing machines, refrigerators, ranges**	Vituous enameling work
Pallo Engineering Ltd (Wellington)	Private company, capital 48,000 pounds	Washing machines	Light engineering
G. E. Patton Ltd (Christchurch)		Refrigerators	Refrigeration engineers
Radiation NZ Ltd (Dunedin)	Subsidiary of Radiation Ltd, England, capital 10,000 pounds*	Ranges	Gas ranges, fuel heaters, fuel cookers
Rinnon Products Ltd (Dunedin)	Private company, capital 2,000 pounds	Clothes dryers	Jugs, Radiators, sheet steel metal work, tubular heater
J and A. P. Scott Ltd (Dunedin)	Public company, capital 191,000 pounds	Washing machines, refrigerators	Waste disposal units
Scott Brothers Ltd (Christchurch)	Public company, capital 20,000 pounds	ranges	coal ranges, general engineering
H. E. Shacklock Ltd (Dunedin)		Ranges, dishwashers	Fuel ranges

Speedway Products Ltd (Auckland)	Public Company, capital 200,000 pounds	Washing machines	Commercial dishwashers, ferrous castings, sheet metal work, heating and ventilating installations
Sturdy Appliances Ltd (Rangiora)		Refrigerators	
Wholesale Refrigerators (Christchurch)		Refrigerators	
H. O. Wiles Ltd (Auckland)	Private comapny, capital 15,000 pounds	Refrigerators	
G. A. Wooller and Co Ltd (Auckland)		Refrigerators	Radios
Zip Heaters Ltd (Lower Hutt)	Private company, capital 30,000 pounds	Washing machines	Water heaters, kerosene radiators, shower attachments

Information given where available
* From Tait 1959.
** Whether Osborne (that is Turnbull and Jones) actually ever made refrigerators and washing machines is doubtfull, certainly Boyles (1989) in his account of the company's history, makes no mention of the manufacture of these goods.

(Source: From Department of Industries and Commerce 1956, pp D1-D6).

Appendix 2.3.

Table 2.3.1. New Zealand Whitegoods Manufacturers 1964*

Location of Plants	Overseas Ownership	Whitegoods Manufactured	Other Manufacturing Activities	Brand Names
	Dominion Radio and Electrical Corporation (subsidiary of Chas. Begg and Co)			
Christchurch	Nil	Refrigerators	A range of other consumer durables	La Gloria,
	National Electrical and Engineering Company (NEECO)			
Auckland	Nil	Washing machines, ranges	Producer and consumer ceramic ware, industrial boilers etc, solid fuel heaters and fires	Neeco, Turner, La Gloria
	Radiation. N.Z. Ltd			
Dunedin	Subsidiary company of John Wright and Co	Washing Machines, ranges, rangettes	Gas ranges, solid fuel ranges, gas water heaters	Champion, New World, Thor
	Scott Bros Ltd			
Christchurch	Nil	Ranges, rangettes	Solid fuel ranges	Atlas
	H. E. Shacklock Ltd (50 percent owned by Fisher and Paykel)			
Dunedin	Nil	Ranges, Dishwashers, rangettes	Solid fuel ranges	Shacklock, Chefmaster
	Osborne Gas Stove Co Ltd (subsidiary of Turnbull and Jones Ltd)			
Christchurch	Nil	Ranges	A range of other consumer durables, power transformers, commercial cooking equipment	Blue Seal, Moffat

		N. R. Cunningham Ltd		
Masterton	Nil	Refrigerators, freezers, washing machines, clothes dryers		Norge, HMV, Princess, Whirlpool
		Dishmaster Ltd		
Wellington	Nil	Washing machine, clothes dryers, dishwashers,		Dishmaster
		Dominion Motors Ltd		
Wellington	Nil	Refrigerators	Car, truck and tractor assembly	Beaty
		Electrolux Ltd		
Wellington	Wholly owned subsidiary of A. B. Elextrolux, Sweden	Refrigerators	Vacuum cleaners, floor polishers	Electrolux
		Fisher and Paykel Ltd		
Auckland	Nil	Refrigerators, freezers, washing machines, clothes dryers	A wide range of consumer durables, commercial air-conditioning, commercial refrigeration	Kelvinator, Leonard, Hoover, Savaday, Washrite, Whiteway, Bendix,
		General Motors Ltd		
Wellington	Wholly owned subsidiary of General Motors Corporation, USA	Refrigerators, freezers, ranges	Vehicle assembly	Frigidaire
		A. C. Harris and Co**		
Christchurch		Washing Machines		
		McAlpine Refrigeration Ltd		
Auckland	The Pressed Steel Company Ltd holds 18% of the ordinary share capital of this company	Refrigerators, freezers	Domestic air conditioning, commercial air conditioning, commercial refrigeration	Prestcold, McAlpine

		Sunbeam N. Z. Ltd		
Lower Hutt	Wholly owned subsidiary of Sunbeam Corporation, USA	Washing machines	Sheep shearing equipment, light engineering sub-contracting job, electric razors, electric fry pans	Sunbeam, Pallo
		Wholesale Refrigerators Ltd		
Christchurch	Nil	Refrigerators		G.E.C.
		Zip Industries Ltd		
Lower Hutt	Consolidated Goldfeilds Australia Pty. Ltd. now owns 51% of the ordinary share capital of this company	Washing Machines	A range of electric consumer durables, aluminium sauce pans, shower attachments, water heaters, kerosene radiators	Zip

This table does not include manufacturers of cabinet clothes dryers.
* Although this table is as complete as possible it may have excluded some minor companies.
** From Consumer 1964, No 18.

(Source: From Sewell 1965, pp 126-131)

Appendix. 2.4. Whitegoods Manufacturers 1972

Table 2.4.1. Whitegoods Manufacturers 1972#

	Location of Assembly Plants	Whitegoods Manufactured	Brandnames
Atlas Appliances Ltd (wholly owned by Atlas Majestic Ltd)**	Christchurch (two plants)	Ranges, cook tops, refrigerators, freezers	Atlas, Polar
Begley's Industries Ltd	Napier	Freezers##	
Bonaire Industries (wholly owned by H. E. Shacklock, who in turn were 50 percent owned by Fisher and Paykel Industries Ltd).	Dunedin		Bonaire
Cunninghams-EMI Group	Masterton	Refrigerators, freezers, washing machines, tumble dryers	HMV-Norge
Dishmaster Appliances	Wellington	Dishwashing machines	Dishmaster
Dominion Radio and Electrical (wholly by Atlas Majestic Ltd)	Auckland	Refrigerators	Polar
Fisher and Paykel Industries Ltd	Auckland (two plants)	Refrigerators, freezers,washing machines, tumble dryers##	Kelvinator, Whiteway, Leonard, Challenge, Foamway, Modern Maid, Savaday, Washrite
General Motors NZ Ltd (wholly owned by General Motors Corpoartion, USA)	Wellington	Refrigerators, freezers, ranges, cook tops	Frigidaire
A. R. Harris Co Ltd	Christchurch	Washing machines (wringer type)	Miss Simplicity
NEECO	Auckland	Washing machines (wringer type)	Beatty, Surgemaster
McAlpine Refrigeration Ltd	Auckland	Refrigerators, freezers*	Prestcold

Osbourne Gas Stove Company (wholly owned by Turnbull Jones Ltd)	Christchurch	Ranges, cooktops	Moffat
Radiation New Zealand Ltd (wholly owned by Tube investments, UK)	Dunedin	Ranges, cook tops, freezers, washing machines, tumble dryers	Champion, Thor, Valiant
H. E. Shacklock Ltd (50 percent owned by Fisher and Paykel Industries Ltd)	Dundedin	Ranges,. cook tops, dish washing machines	Shacklock, Chefmaster
Sunbeam NZ Ltd (wholly owned by Sunbeam Corporation, USA)	Wellington	Washing machines (wringer type)	Pallo
W. O. Askew. and Co Ltd	DNA###	Freezers	Iceaire

Precision Engineering (of Wellington) also made a 2 cubic feet refrigerator for min-bars and caravans.

* McAlpine only desiged and marketed its refrigerators and freezers, production was contracted to Fisher and Paykel (Designscape 1971, No 31. Baker 1988)

** Scott Bros changed its name to Atlas appliances in the early 1970s. Charles Begg and Co (nee Chas. Begg and Co) changed its name to Atlas Majestic Industries in 1971 (Charles Begg and Co 1972). Atlas Appliances absorbed Wholesale Refrigerators (another Christchurch based company owned by Charles Begg owned company) in 1969 or early in 1970 (Charles Begg and Co 1970-1971).

This table is (in part) based upon sources from 1971 and early 1973 so it is possible that their are some discrepancies. Also the table does not include manufacturers of cabinet clothes dryers (although see Consumer 1970, No 62). Of the companies listed here, only three, Begley's, Zip, and Dishmaster made cabinet dryers. Also NEECO did market a cabinet dryer which it had made for it under contract.

Fisher and Paykel, and Begley's Industries imported some refrigerators from Australia (under the NAFTA agreement) to supplement local production.

Data not available

(Sources: Designscape. Consumer. Otago Daily Times. The Press. Chas Begg and Co 1972-1974. Boyles 1988. Angus 1973. Personal interviews. Personal correspondence).

Appendix 2.5. Whitegoods Manufacturers - 1980

Table 2.5.1. Whitegoods Manufacturers - 1980.

	Location of Assembly Plants	Whitegoods manufactured	Brandnames (when known)
Atlas Appliances Ltd (wholly owner by Atlas Majestic Industries Ltd)	Christchurch (ranges), Masterton (washing machines, tumble dryers, refrigerators and freezers)*	Ranges, cooktops, washing machines, tumble dryers, refrigerators and freezers	Atlas, Norge, Simpson
Champion Appliances Ltd (wholly owned by Tube Holdings Ltd, UK)**	Dunedin	Ranges, cooktops, washing machines, tumble dryers, dishwashers	Champion
Fisher and Paykel	Auckland (two plants)	Refrigerators, freezers, washing machines, tumble dryers#	Kelvinator, Frigidaire,*** Leonard, Whiteway
A. C. Harris and Co Ltd	Christchurch	Washing machines (wringer type)	Miss Simplicity
Moffat Appliances (wholly owned by Turnbull Jones Ltd)##	Christchurch	Ranges, cooktops	Moffat
H. E. Shacklock Ltd (50 percent owned by Fisher and Paykel Industries Ltd)	Dunedin (two plants)	Ranges, cooktops, freezers, dishwashers	Shacklock (as well as several of the Fisher and Paykel brandnames)

#Fisher and Paykel was making a range of refrigerators and feezers under contract for McAlpine Industries Ltd (formerly McAlpine Refrigeration Ltd). Fisher and Paykel was also importing a range of Australian products, and automatic washing machines from Japan to supplement its product range.

Osborne Gas Stove Co had its name changed to Moffat Appliances in 1974 (Boyles 1988).

* Between 1972 and 1976 Atlas Appliances was involved in a joint venture with Malleys of Australia, exporting refrigerators and freezers to Australia and (for a time) assemblying washing machines produced by Malleys. This partnership was dissolved in 1976 and Atlas Appliance closed its refrigerator and freezer factory in early 1977 (Atlas Majestic Industries 1971-1978).

In November of 1979 Atlas Majestic Industries purchased Master Industries (nee Simpson-Pope (NZ) (1974-1977), nee Cunninghams-EMI Group (1972-1974), nee N. R Cunninghams (1930-1972) which made washing machines, tumble dryers, freezers, refrigerators, and dishwashing machines in Masterton (Personal interviews. Consumer. Atlas Majestic Industries 1979-1980).

** ex-Radiation Appliances, the comapany changed its name in 1979 (Otago Daily Times 1980, July 2).

*** In 1973 General Motors introduced a range of automatic washing machines and tumble dryers (Personal correspondence). Then three years latter General Motors began withdrawing from the New Zealand market. Whilst so doing it made an arrangement for Fisher and Paykel to manufacture a range of products which General Motors distributed. In July 1989 Fisher and Paykel purchased the Frigidaire trademark from White Consolidated Industries (who had purchased General Motors American whitegoods operations) (NZ Commerce Commission 1989, pp 34).

(Source: Atlas Majestic Industries 1978-1980. Otago Daily Times. Fisher and Paykel 1981. Personal interviews).

Appendix 2.6. New Zealand Manufacturers - 1986

Table 2.6.1. Whitegood manufacturers 1986

	Location of Assembly Plants	Whitegoods Manufactured	Brandnames
Atlas Appliances Ltd (wholly owned by Ceramco)*	Christchurch	Ranges, cooktops	Atlas
Champion Appliances (wholly owned by Sanyo Autocrat Holdings Ltd)#	Dunedin	Ranges, cooktops, dishwashers, washing machines, tumble dryers##	Champion, Sanyo
Fisher and Paykel Industries Ltd**	Auckland (two plants) (refrigerators, freezers, washing machines, tumble dryers), Dunedin (Ranges, cooktops, and dishwashers)	Ranges, cooktops, dishwashers, refrigerators, freezers, washing machines, tumble dryers***	Frigidaire, Kelvinator, Leonard, Shacklock
Moffat Appliances (wholly owned by Welgas Holdings)	Christchurch	Ranges, cooktops	Moffat

* Atlas Appliances Masterton operations were closed in April 1981 (NZ Herald. Atlas Corp. Personal interviews). Production of a small number of number of dishwashers continued until May of 1983 (a line Master Industries had aquired from Dishmaster Appliances - a Wellington company who were in receivership - in 1977). In September of 1983 a newly formed company, Dishmaster (1983), purchased the tooling for all Dishmaster appliances, and between late 1983 and early 1984 it produced 20 domestic dishwashers, after which production was discontinued due to lack of demand. Dishmaster (1983) does still, however, manufacture commercial dishwashers as well as a range of catering equipment (Personal interviews).

Atlas Majestic Industries changed its name in late 1981 to Atlas Corporation (NZ Herald 1981, November 25). It then merged with Ceramco in late 1985 (Andrews 1987).

** Fisher and Paykel purchased H. E. Shacklock outright in March 1981 (NZ Herald 1981, March 26).

*** Fisher and Paykel was also manufacturing a range of products for McAlpine Industries (nee McAlpine Prestcold) (Commerce Commission. 1989, pp 36).

Champion Appliances was purchased by Sanyo Autocrat Holdings (NZ) Ltd in April 1981 (Otago Daily Times 1981, April 14).

(continued over page)

Between 1983 and 1987 Champion assembled a 2 in 1 front loading automatic washing machine and dryer from knocked-down-kits supplied by an Italian company. Prior to this it had been undertaking fully scale manufacturing of both these products (although the designs for both were based substantially upon English designs supplied by Radiation's English owner). This washer was complimented in 1986 with the introduction of a top loading automatic washing machine and a tumble dryer assembled from kits supplied from Japan by Sanyo (who owned 20 percent of Sanyo Autocrat holdings). Champion also introduced a dishwasher in 1982 (based upon a design purchased from a Swedish company ASKO, a company which currently exports directly to New Zealand) (Consumer. Autocrat Sanyo (NZ) Holdings 1982-1985. Personal Interviews).

(Sources: Fisher and Paykel 1986-1987. Ceramco 1986-1987. Sanyo Autocrat Holdings 1986-1987. Boyles 1988. Consumer. Personal interviews).

Appendix 3.1. The Original Import Licensing Reduction Schedule Under CER.

Table 3.1. Original Import Licensing Reduction Schedule for Whitegoods Under CER - Percentage Market Share

	Refrigerators and Freezers	Dishwashers	Clothes Washing and Drying Machines	Electric Ranges
1983	17	17	15	6
1984	17	17	15	6
1985	22	22	20	10
1986	22	22	20	10
1987	30	30	25	17.5
1988	30	30	25	17.5
1989	LOD	LOD	LOD	27.5
1990				27.5
1991				LOD

* LOD Stands for license on demand

(Source: Appendices of the Journal of the House of Representatives).

BIBLIOGRAPHY

Company Annual Reports

Atlas Corporation Limited 1984. 1985.

Atlas Majestic Industries Limited 1973-1981.

Autocrat Sanyo holdings (NZ) Limited 1981-1987.

Ceramco Corporation Limited 1985-1989.

Charles Begg and Company Limited 1967. 1970-1972.

Electrolux Limited 1979-1981.

Email Limited 1984-1990.

Fisher and Paykel Industries Limited 1981-1991.

McAlpine Prestcold Limited 1974-1981.

McApline Industries 1982-86.

Sanyo (NZ) Limited 1988.

Simpson Holdings Limited 1983-1985.

Zip Holdings Limited 1970-75.

Miscellaneous

Andrews G. 1987: Overview of the Industry Involved with the Manufacture of Domestic Electrical Appliances and Housewares. Transcript of a seminar supplied by the NZ Ministry of Commerce.

Fisher and Paykel mid 1960s (exact date unknown): The Acorn and the Oak Tree - the Story of a New Zealand Industry.

Fisher and Paykel 1991a: Submission to the Labour Select Committee on the Employment Contracts Bill. Transcript.

General Motors (NZ) 1976: General Motors New Zealand Limited commemorates 50 years of Progress.

New Zealand Amalgamated Engineers Union 1991: Submission to the Labour Select Committee on the Employments Contract Bill.

New Zealand Council of Trade Unions 1991: Submission to the Labour Select Committee on the Employments Contract Bill.

Radio New Zealand 1991: Fisher and Paykel - An 'Insight' Documentary. July 28.

Williams J. 1979: The Effect of Automation on the Workforce. Transcript of oral presentation.

Newspapers and Magazines

Auckland Star

Australian

Christchurch Press

Consumer

Designscape

Dominion

Dominion Sunday Times

Examiner

Headliner

Manufacturer

New Zealand Herald

Otago Daily Times

Retail News

Sunday Star

Government Publications

Australian BIE 1983: Structural Adjustment in the Australian Whitegoods Industry - Research Report No. 14. Canberra.

Economic Monitoring Group 1986: Labour Market Flexibility. NZ Planning Council, Wellington.

New Zealand Arbitration Court and Arbitration Commission 1987: Awards, Agreements, and Apprenticeship Orders. Vol. 87. Part. 14. "New Zealand Metal Trades Award." Document. 247.

New Zealand Commerce Commission 1989: Decision No. 225. Wellington.

New Zealand Department of Industries and Commerce 1956: Report on New Zealand Industry No. 72 - Household Electrical Appliances. Wellington.

New Zealand Department of Statistics 1989: Economy Wide Census - Manufacturing. Wellington.

New Zealand Department of Statistics: Business Trends. Wellington.

New Zealand Department of Statistics: Census of Manufacturing. Wellington.

New Zealand Department of Statistics: Census of Population Dwellings. Wellington.

New Zealand Department of Statistics: Monthly Abstract of Statistics. Wellington.

New Zealand Department of Statistics: New Zealand External Trade - Exports. Wellington.

New Zealand Department of Statistics: New Zealand External Trade - Imports. Wellington.

New Zealand Government 1983: Appendix to the Journal of the House of Representatives of New Zealand. Vol. 1. A. 20.

New Zealand Industries Development Commission 1982: Report No. 20 - The New Zealand Electronics Industry Development Plan to 1992. Wellington.

New Zealand Planning Council 1989: The Economy in Transition: Restructuring to 1989. New Zealand Planning Council, Wellington.

United Nations: Industrial Statistics Yearbook: Vol. II. Commodity Production Statistics. New York.

United Nations: The Growth of World Industry: Vol. II. Commodity Production Data. New York.

Books and Articles

Aglietta M. 1982: " World Capitalism in the Eighties." New Left Review. No. 136, pp. 5-42.

Aglietta M. 1987: A Theory of Capitalist Regulation. Verso, London.

Albertsen N. 1988: "Postmodernism, Post-Fordism, and Critical Social Theory." Environment and Planning D: Society and Space. Vol. 6, pp. 339-365.

Altshuler A. Anderson M. Jones D. Roos D. Womack J. 1984: The Future of the Automobile. MIT Press, Cambridge Mass.

Amberg 1991: "Democratic Producerism: Enlisting American Politics For Work Place Flexibility." Economy and Society. Vol. 20, No. 1, pp. 57-78.

Amin A. Robins K. 1990: " The Re-Emergence of Regional Economies? The Mythical Geography of Flexible Accumulation." Environment and Planning D: Society and Space. Vol. 8, pp. 7-34.

Amsden A. 1990: "Third World Industrialisation: 'Global Fordism' or a New Model?" New Left Review. No. 182. pp. 5-32.

Anderson G. 1991: "The Employment Contracts Act 1991: An Employer's Charter?" New Zealand Journal of Industrial Relations. Vol. 16, pp. 127-142.

Angus J. 1973: The Iron Masters. H. E. Shacklock Ltd, Dunedin

Armstrong P. Glyn A. Harrison J. 1984: Capitalism Since World War Two: The Make up and break up of the Great boom. Fontana, London.

Armstrong R. 1978: "New Zealand: Imperialism, Class and Uneven Development." Australia and New Zealand Journal of Sociology. Vol. 9, No. 3, pp. 297-303.

Arthur W. 1988: "Competing Technologies: An Overview." in Dosi G. Freeman C. Nelson R. Silverberg G. Soete L. (eds). Economic Change and Economic Theory. Printer, London, pp. .67-94.

Bell D. 1973: The Coming of Post-Industrial Society: A Venture in Social Forecasting. Basic Books, New York.

Blackburn P. Coombes R. Green K. 1986: Technology Economic Growth and the Labour Process. MacMillan, London.

Blueston B. Harrison B. 1982: The Deindustrialisation of America. New York.

Blyth C. 1973: "The Special Case: Political Economy of New Zealand." in Webb S. Collette J. (eds). New Zealand Society: Contemporary Perspectives. John Wiley, Sydney. pp. 3-12.

Blyth C. 1974: "The Industrialisation of New Zealand." New Zealand Economic Papers, pp. 1-22.

Bockerstette J. 1988: "Misconceptions Abound Concerning Just-In-Time Operating Philosophy." Industrial Design. Vol. 20, No. 9, pp. 54-58.

Bollard A. 1987: "More Market: The Deregulation of Industry." in Bollard A. Buckle R. (eds). Economic Liberalisation in New Zealand. Allen and Unwin, Wellington, pp. 25-45.

Bollard A. Buckle R. (eds). 1987: Economic Liberalisation in New Zealand. Allen and Unwin, Wellington.

Bose G. Ashok R. 1988: "Implementing JIT with MRP II Creates Hybrid Manufacturing Environment." Industrial Design. Vol. 20, No. 9, pp. 49-53.

Boston J. 1987: "Wages Policy and Industrial Relations Reform." in Boston J. Holland M. (eds). The Forth Labour Government: Radical Politics in New Zealand. Oxford University, Auckland, pp. 151-183.

Boston J. 1989: "The Treasury and the Organisation of Economic Advice: Some International Comparisions." in Easton B. (ed). The Making of Rogernomics. Auckland University, Auckland, pp. 68-91.

Boston J. Holland M. (eds). 1987: The Forth Labour Government: Radical Politics in New Zealand. Oxford University, Auckland.

Boyer R. 1988a: "Technical Change and the Theory of 'Régulation.'" in Dosi G. Freeman C. Nelson R. Silverberg G. Soete L. (eds). Economic Change and Economic Theory. Printer, London, pp. .67-94.

Boyer R.1988b: "Formalising Growth Regimes." in Dosi G. Freeman C. Nelson R. Silverberg G. Soete L. (eds). Economic Change and Economic Theory. Printer, London.pp, 608-630.

Boyer R. 1988c: "Wage/Labour Relations, Growth, and Crisis: A Hidden Dialectic." in Boyer R. (ed) The Search for Labour Market Flexibility: The European Economies in Transition. Clarendon, Oxford, pp. 3-25.

Boyer R. 1988d: "Division or Unity? Decline or Recovery?" in Boyer R. (ed). The Search for Labour Market Flexibility: The European Economies in Transition. Clarendon, Oxford, pp. 194-221.

Boyer R. 1988e: "Defensive or Offensive Flexibility?" in Boyer R. (ed). The Search for Labour Market Flexibility: The European Economies in Transition. Clarendon, Oxford, pp. 222-251.

Boyer R. 1988f: " The Search for New Wage/Labour Relations: Complex and Contradictory, but Crucial." in Boyer R. (ed). The Search for Labour Market Flexibility: The European Economies in Transition. Clarendon, Oxford, pp. 252-273.

Boyer R. (ed). 1988: The Search for Labour Market Flexibility: The European Economies in Transition. Clarendon, Oxford.

Boyles L. 1988: Turnbull and Jones: 1899-1984 First in the Industry. Cory Wright and Salamon, Wellington.

Braverman H. 1974: Labour and Monopoly Capitalism: The Degradation of Work in the Twentieth Century. Monthly Review, London.

Britton S. Le Heron R. Pawson E. (eds). 1992: Changing Places in New Zealand: A Geography of Restructuring. New Zealand Geographical Society, Christchurch.

Brooking T. 1981: "Economic Transformation." in Oliver W. Williams B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 226-249.

Brosnan P. Smith D. Walsh P. 1990: The Dynamics of New Zealand Industrial Relations. John Wiley, Auckland.

Burawoy M. 1985: The Politics of Production: Factory Regimes Under Capitalism and Socialism. Verso, London.

Burt D. 1989: "Managing Suppliers Up to Speed." Harvard Business Review. No. 4, pp. 127-135.

Castells M. (ed). 1985: High Technology, Space and Society. Urban Affairs Annual Review 28. Sage, Beverley Hills.

Castells M. 1980: The Economic Crisis and American Society. Princeton, New Jersey.

Castells M. 1985: "High Technology, Economic Restructuring and the Urban-Regional Process in the US." in Castells. M. (ed). High Technology, Space and Society. Urban Affairs Annual Review 28. Sage, Beverley Hills.

Chapman K. 1987. (ed): Technological Change and Industrial Policy. Blackwell, Oxford.

Chapman R. 1981: "From Labour to National." in Oliver W. Williams B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 333-368.

Clarke G. 1986: " The Crisis of the Mid-West Auto Industry." in Scott A. Storper M. Production Work and Territory: The Geographic Anatomy of Industrial Capitalism. Allen and Unwin, Boston.

Clarke S. 1988a: "Overaccumulation, Class struggle and the Regulation Approach." Capital and Class. No. 36, pp. 59-92.

Collins S. 1989: "Rogernomics: The Economic Aftermath." in Easton B. (ed). The Making of Rogernomics. Auckland University, Auckland, pp. 188-206.

Condliffe J. 1930: New Zealand in the Making. George Allen and Unwin, London.

Cook M. 1985: "The Contradictions of Post-War Reconstruction: The Aspirations and Realities of a Post-War Generation of Wifes and Mothers." in Haines H. (ed). Women's Studies Conference Papers '84. Women's Studies Association, Auckland.

Coombs R. 1985: "Automation, Management Strategies and Labour-Process Change." in Knights D. Willmott H. Collinson D. (eds). Job Redesign: Critical Perspectives on the Labour Process. Gower, Brookfield, pp. 142-170.

Corley T. 1966: Domestic Electrical Appliances. Johnathan Cape, London.

Cowan R. 1976: "The 'Industrial Revolution' in the Home: Household Technology and Social Change in the Twentieth Century." Technology and Culture. Vol. 17, No. 1, pp. 1-23.

Crocombe G. Enright M. Porter M. 1991: Upgrading New Zealand's Competitive Advantage. Oxford University Press, Auckland.

Cusumano M. 1985: The Japanese Automobile Industry: Technology and Management at Nissan and Toyota. Harvard University, Cambridge, Mass.

Dalziel R. 1981: "The politics of Settlement." in Oliver. W. Williams. B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 87-111.

Demming 1982: Out of the Crisis. MIT, Cambridge.

De Vroey M. 1984: "A Regulation Approach Interpretation of the Contemporary Crisis." Capital and Class. No. 23, pp. 45-66.

Dicken. P. 1986. Global Shift. Paul Chapman, London.

Dosi G. 1982: "Technological Paradigms and Technological Trajectories: A Suggested Interpretation of the Determinants and Directions of Technical Change." Research Policy. Vol 11. pp. 147-162.

Dosi G. 1988: "The Nature of the Innovation Process." in Dosi G. Freeman C. Nelson R. Silverberg G. Soete L. (eds). Economic Change and Economic Theory. Printer, London, pp. 221-238.

Dosi G. Freeman C. Nelson R. Silverberg G. Soete L. (eds). 1988: Economic Change and Economic Theory. Printer, London.

Dosi G. Oresenigo L. 1988: "Coordination and Transformation: An Overview of Structures, behaviours and Change in Evolutionary Environments." in Dosi G. Freeman C. Nelson R. Silverberg G. Soete L. (eds). Economic Change and Economic Theory. Printer, London, pp. 13-37.

Drucker P. 1989: The New Realities. Heinemann, Oxford.

Dunford M. and Perrons D. 1986: "The Restructuring of the Post-war British Space Economy." in Martin R. Rowthorn B. (eds). Deindustrialization and the British Space Economy. MacMillian, London, pp. 53-105.

Dunford M. 1990: "Theories of Regulation." Environment and Planning D: Society and Space. Vol. 8, pp. 297-321.

Dunstall G. 1981: "The Social Pattern." in Oliver W. Williams B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 396-429.

Du Vall N. 1988: Domestic Technology: A Chronology of Developments. G. K. Hall, Boston.

Easton B. 1976: Consumption in New Zealand 1954-5 to 1964-5. New Zealand Institute of Economic Research, Wellington.

Easton 1987a: "Labour's Economic Strategy." in Boston J. Holland M. (eds). The Forth Labour Government: Radical Politics in New Zealand. Oxford University, Auckland, pp. 134-150.

Easton 1989a: "The Commercialisation of the New Zealand Economy: From Think Big to Privatisation." in Easton B. (ed). The Making of Rogernomics. Auckland University, Auckland, pp. 114-131.

Easton B. (ed). 1989. The Making of Rogernomics. Auckland University, Auckland.

Easton B. 1987b: "The Labour Market and Economic Liberalisation." in Bollard A. Buckle R. (eds). 1987: Economic Liberalisation in New Zealand. Allen and Unwin, Wellington, pp. 181-205.

Edwards R. 1979: Contested Terrain: The Transformation of Work in the Twentieth Century. Heinemann, New York.

Eldred-Grigg S. 1980: A Southern Gentry: New Zealanders Who Inherited the Earth. A. H. and A. W. Reed, Wellington.

Endres A. 1989: "Perceptions of 'Full Employment' in Relation to Other Major Policy Goals, 1984-1988." in Easton B. (ed). The Making of Rogernomics. Auckland University, Auckland, pp. 132-148.

Estall R. 1985: "Stock Control in Manufacturing: The Just-In-Time System and its Locational Implications." Area. Vol. 17, No. 2, pp. 29-133.

Fairburn M. 1975: "The Rural Myth and the New Urban Frontier." New Zealand Journal of History. Vol. 9, No. 1, pp. 2-21.

Foster J. Woolfson C. 1989: "Corporate Reconstruction and Business Unionism: The Lessons of Caterpillar and Ford." New Left Review. No. 174, pp. 51-66.

Franklin H. 1960: "The Village and the Bush." Pacific Viewpoint. Vol. 1, No. 2, pp. 143-182.

Franklin H. 1978: Trade Growth and Anxiety: New Zealand Beyond the Welfare State. Methuen, Wellington.

Franklin H. 1985: Cul-de-sac: The Question of New Zealand's Future. Unwin, Wellington.

Franklin H. McQueen A. 1973: "The Ad Hoc Economy." in Webb S. Collette J. (eds). New Zealand Society: Contemporary Perspectives. John Wiley, Sydney. pp. 13-17.

Freeman C. Clarke J. Soete L. 1982: Unemployment and Technical Innovation - A Study of Long Waves and Economic Development. Frances Pinter, London

Freeman C. Soete L. 1987: "Information Technology and Change in Techno-Economic Paradigm." in Freeman C. Soete L.(eds). Technical Change and Full Employment. Basil Blackwell, Oxford.

Freeman C. Soete L. (eds). 1987: Technical Change and Full Employment. Basil Blackwell, Oxford.

Freeman C. Perez C. 1988: "Structural Crises of Adjustment, Business Cycles and Investment Behaviour." in Dosi G. Freeman C. Nelson R. Silverberg G. Soete L. (eds). Economic Change and Economic Theory. Printer, London, pp. 38-66.

Gardner W. 1981: "A Colonial Economy." in Oliver W. Williams B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 57-86.

Gertler M. 1989: "Restructuring Flexibility? A Reply to Schoenberger." Transactions of the Institute of British Geographers. Vol. 14, pp. 109-112.

Giddens A. 1981: A Contemporary Critique of Historical Materialism. Vol. 1. MacMillan, London.

Giddens A. 1984: The Constitution of Society. Polity Press, Cambridge.

Gilson M. 1970: "The Changing New Zealand Family: A Demographic Analysis." in Houston S. (ed). Marriage and the Family in New Zealand. Sweet and Maxwell, Wellington.

Goodman D. Sorj B. Wilkinson J. 1987: From Farming to Biotechnology. Blackwell, Oxford.

Gould P. 1982: The Rake's Progress? The New Zealand Economy Since 1945.Hodder and Stoughton, Auckland.

Graham J. 1981: "Settler Society." in Oliver W. Williams B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 112-139.

Haines H. (ed). 1985: Women's Studies Conference Papers '84. Women's Studies Association, Auckland.

Halal W. 1986: The New Capitalism. John Wiley, New York.

Harbridge R. 1990: "Flexibility in Collective Wage Bargaining in New Zealand: Facts and Folk Law." New Zealand Journal of Industrial Relations. Vol. 15, pp. 241-250.

Harbridge R. Dreaver M. 1989: " Changing Patterns of Working Time Arrangements in Registered Collective Agreements in New Zealand." New Zealand Journal of Industrial Relations. Vol. 14, pp. 251-265.

Harvey D. 1989a: The Urban Experience. Blackwell, Oxford.

Harvey D. 1989b: The Condition of Post-Modernity: An Inquiry in to the Nature of Cultural Change. Basil Blackwell, Oxford.

Harvey D. Scott A. 1989: "The Practice of Human Geography: Theory and Empirical Specificity in the Transition from Fordism to Flexible Accumulation." In MacMillan B. (ed). Remodelling Geography. Blackwell, Oxford, pp. 217-229.

Hawke G. 1981: "The Growth of the Economy." in Oliver W. Williams B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 369-395.

Hawke G. 1985: The Making of New Zealand: An Economic History. Cambridge university Press, Cambridge.

Hayes R. Jaikumar R. 1988: "Manufacturing's Crisis: New Technologies, Obsolete Organisations." Harvard Business Review. No. 5, pp. 77-85.

Heilbroner R. 1985: The Nature and the Logic of Capitalism. W. W. Norton, New York.

Heilbroner R. 1988: Behind the Veil of Economics: Essays in the Worldly Philosophy. W. W. Norton, New York.

Henderson J. Castells M. (eds).1987: Global Restructuring and Territorial Development. Sage, London.

Holloway J. 1987: "The Red Rose of Nissan." Capital and Class. Vol. 32, pp. 142-64.

Holmes J. 1986: "The Organisation and Location of Production Sub-contracting." in Scott A. Storper M. Production Work and Territory: The Geographic Anatomy of Industrial Capitalism. Allen and Unwin, Boston, pp. 80-106.

Holmes J. 1987: "Technical Change and the Restructuring of the North American Automobile Industry." in Chapman. K. (ed). Technological Change and Industrial Policy. Blackwell, Oxford. pp. 121-156.

Holmes J. 1988: "Industrial Restructuring in a Period of Crisis: An Analysis of the Canadian Automobile, 1973-83." Antipode. Vol. 20, No. 1, pp. 19-51.

Houston S. (ed). 1970: Marriage and the Family in New Zealand. Sweet and Maxwell, Wellington.

Howells J. 1974: "Industrial Conflict in New Zealand - The Last Twenty Years." in Howells J. Woods N. Young F. (eds). Labour and Industrial Relations in New Zealand. Pitman Pacific. Carlton, pp. 161-178.

Howells J. Woods N. Young F. (eds). 1974: Labour and Industrial Relations in New Zealand. Pitman Pacific. Carlton.

Hohner G. 1988: "JIT/TQC: Integrating Product Design with Shop Floor Effectiveness." Industrial Design. Vol. 20, No. 9, pp. 42-48.

Hounshell D. 1984: From the American System to Mass Production. John Hopkins, Baltimore.

James C. 1986: The Quiet Revolution: Turbulence and Transition in Contemporary New Zealand. Allen and Unwin, Wellington.

Jesson B. 1987: Behind the Mirror Glass: The Growth of wealth and Power in New Zealand in the Eighties. Penguin, Auckland.

Jesson B. 1988: "The Libertarian Right." in Jesson B. Ryan A. Spoonley P. The Revival of the Right: New Zealand Politics in the 1980s. Heinemann Reed, Auckland, pp. 30-55.

Jesson B. 1989: Fragments of Labour: The Story Behind the Labour Government. Penguin, Auckland.

Jesson B. Ryan A. Spoonley P. 1988: The Revival of the Right: New Zealand Politics in the 1980s. Heinemann Reed, Auckland.

Jessop B. 1990: "Regulation Theories in Retrospect and Prospect." Economy and Society. Vol. 19, No. 2, pp. 153-216.

Jessop B. Bonnett K. Bromley S. 1990: "Farewell to Thatcherism? Neo Liberalism and 'New Times.'" New Left Review. No. 179, pp. 81-102.

Jessop B. Bonnett K. Bromley S. Ling. T. 1984: "Authoritarian Populism, Two Nations, and Thatcherism." New Left Review. Vol. 147, pp. 33-61.

Jessop B. Bonnett K. Bromley S. Ling T. 1987: " Popular Capitalism, Flexible Accumulation and Left Strategy." New Left Review. Vol. 165, pp. 104-122.

Johnston R. (ed). 1973: Urbanisation in New Zealand. Reed Education, Wellington.

Jones R. 1988: "Involve Us in Decision Making." Manufacturer. April, pp. 3.

Kelly D. 1986: "St Lucia's Female Electronics Factory Workers: Key Components in an Export Orientated Industrialisation Strategy." World Development. Vol. 14, No. 7, pp. 823-838.

Klein J. 1989: "The Human Cost of manufacturing Reform." Harvard Business Review. No. 2, pp. 60-66.

Knights D. Willmott H. Collinson D. (eds). 1985: Job Redesign: Critical Perspectives on the Labour Process. Gower, Brookfield.

Koopman-Boyden P. (ed). 1978: Families in New Zealand Society. Methuen, Wellington.

Lash S. Urry J. 1987: The End of Organised Capitalism. Polity Press, Cambridge.

Le Heron R. 1989a: "A Political Economy Perspective on the Expansion of New Zealand Livestock Farming, 1960-1984: Part I. Agricultural Policy." Journal of Rural Studies. Vol. 5, No. 1, pp. 17-32.

Le Heron R. 1989b: "A Political Economy Perspective on the Expansion of New Zealand Livestock Farming, 1960-1984: Part II. Aggregate Farmer Responses - Evidence and Policy Implications." Journal of Rural Studies. Vol. 5, No. 1, pp. 33-43.

Leborgne D. Lipietz A. 1988: " New Technologies, New Modes of Regulation: Some Spatial implications." Environment and Planning D: Society and Space. Vol. 6, pp. 263-280.

Linge G. 1957: "The Location of Manufacturing in New Zealand." New Zealand Geographer. Vol. 13, No. 1, pp. 1-19.

Linge G. 1991a: "Just-In-Time in Australia: A Review." Australian Geographer. Vol. 22, No. 1, pp. 67-74.

Linge G. 1991b: "Just-In-Time: More or Less Flexible?" Economic Geography. Vol. 67, No. 4, pp. 316-332.

Lipietz A. 1985: The Enchanted World. Verso, London.

Lipietz A. 1986: "New Tendencies in the International Division of Labour." in Scott A. Storper M. (eds). 1986: Production Work and Territory: The Geographic Anatomy of Industrial Capitalism. Allen and Unwin, Boston, pp. 16-40).

Lipietz A. 1987: Miracles and Mirages: The Crises of Global Fordism. Verso, London.

Littler C. 1985: "Taylorism, Fordism and Job Redesign." in Knights D. Willmott H. Collinson D. (eds). Job Redesign: Critical Perspectives on the Labour Process. Gower, Brookfield, pp. 30-51.

Lloyd P. 1987: "Australia-New Zealand Trade Relations: NAFTA to CER." in Sinclair K. (ed). Tasman Relations: New Zealand and Australia, 1788-1988. Auckland University, Auckland, pp. 142-163.

Magazine I. Paturikin M. 1989: "Cold Competition: GE Wages the Refrigerator War." Harvard Business Review. No. 2, pp. 114-124.

Marris P. 1987: Meaning and Action: Community Planning and Conceptions of Change. Routledge, London.

Marshall M. 1987: Long Waves of Regional Development. MacMillan, London.

Martin R. Rowthorn B. (eds). 1986: Deindustrialization and the British Space Economy. MacMillian, London.

Massey D. 1979: "In what sense a regional problem?" Regional Studies. pp. 73-89.

Massey D. 1984: Spatial Divisions of Labour. MacMillan, London.

McAndrew I. Hursthouse P. 1991: Reforming Labour Relations: What Southern Employers Say." New Zealand Journal of Industrial Relations. Vol. 16, pp. 1-11.

Macmillan B. (ed). 1989: Remodelling Geography. Blackwell, Oxford.

Meyer P. 1986: "Computer Controlled Manufacture and the Spatial Distribution of Production." Area. Vol. 18, No. 3, pp. 209-213.

Miller R. 1991: "Selling Mrs. Consumer: Advertising and the Creation of Suburban Socio-Spatial Relations, 1910-1930." Antipode. Vol. 23, No. 3, pp. 262-301.

Milne S. 1991. "The UK Whiteware Industry: Fordism, Flexibility of Somewhere in Between." Regional Studies. Vol. 25, No. 3, pp. 239-253.

Mitter S. 1986: "Industrial Restructuring and Manufacturing Homework: Immigrant Women in the UK Clothing Industry." Capital and Class. Vol. 27, pp. 37-80.

Monden Y. 1981a: "What makes the Toyota Production System Really Tick?" Industrial Engineering, Vol. 13, No. 1, pp. 36-46.

Monden Y. 1981b: "Adaptable Kanban System Helps Toyota Maintain Just-In-Time Production." Industrial Engineering. Vol. 13, No. 5, pp. 29-45.

Monden Y. 1981c: "Smoothed Production Lets Toyota Adapt to Demand Changes and Reduce Inventory." Industrial Engineering. Vol. 13, No. 8, pp. 42-51.

Moulaert F. Swyngedouw E. 1989: A Regulation Approach to the Geography of Flexible Production Systems." Environment and Planning D: Society and Space. Vol. &, pp. 327-345.

Muller-Jentsch W. 1991: "Productive Forces and Industrial Citizenship - An Evolutionary Perspective on Labour Relations." Economic and Industrial Democracy. Vol. 12, No. 4, pp. 439-468.

New Zealand Employers Federation 1978: Balance in Bargaining. New Zealand Employers Federation, Wellington.

Offe C. 1985: Disorganised Capitalism: Contemporary Transformations of Work and Politics. Polity Press, Cambridge.

Oliver H. 1989: "The Labour Caucus and Economic Policy Formation, 1981-1984." in Easton B. (ed). The Making of Rogernomics. Auckland University, Auckland, pp. 11-52.

Oliver W. Williams B.(eds). 1981: The Oxford History of New Zealand. Oxford University Press, Wellington.

Olssen E. 1981: "Towards a New Society." in Oliver W. Williams B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 250-278.

Olssen E. Levesque A. 1978: "The Changing New Zealand Family." in Koopman-Boyden P. (ed). Families in New Zealand Society. Methuen, Wellington.

Pearson D. Thorns C. 1983: Eclipse of Equality: Social Stratification in New Zealand. George Allen and Unwin, Sydney.

Perez C. 1985: "Microelectronics, Long Waves and World Structural Change: New Perspectives for Developing Countries." World Development. Vol. 13, No. 3, pp. 441-463).

Piore M. Sabel C. 1984: The Second Industrial Divide. Basic Books. New York.

Pred A. 1981: "Production, Family and Free-Time Projects: A Time-Geographic Perspective on the Individual and Social Change in Nineteenth-Century United States Cities." Journal of Historical Geography. Vol. 7, pp. 3-36.

Ricardson L. 1981: "Parties and Political Change." in Oliver W. Williams B. (eds). The Oxford History of New Zealand. Oxford University Press, Wellington. pp. 197-225.

Rich D. 1986: The Industrial Geography of Australia. Methuen, North Ryde.

Roper B. 1991a: "From the Welfare State to the Free Market: Explaining the Transition - Part I: The Existing Accounts." New Zealand Sociology. Vol. 6, No. 1, pp. 38-63.

Roper B. 1991b: "From the Welfare State to the Free Market: Explaining the Transition - Part II: Class, Crisis, Ideology and the State." New Zealand Sociology. Vol. 6, No. 2, pp. 135-176.

Rose W. 1969: "Manufacturing Policy in New Zealand 1958-1968." Pacific Viewpoint. Vol. 10, No. 1, pp. 57-86.

Rose W. 1971: Development Options in the New Zealand Motor Car Assembly Industry. NZ Institute of Economic Research, Wellington.

Rosenberg W. 1960: Full Employment - Can the New Zealand Economic Miracle Last? A. H. and A. W. Reed, Wellington.

Ryan A. 1988: "Remoralising Politics." in Jesson. B. Ryan. A. Spoonley. P. The Revival of the Right: New Zealand Politics in the 1980s. Heinemann Reed, Auckland, pp. 56-85.

Sahal D. 1985: "Technological Guideposts and Innovation Avenues." Research Policy. Vol. 14, pp. 61-82.

Savage J. Bollard A. (eds). 1990: Turning it Around: Closure and Revitalisation in New Zealand Industry. Oxford University, Auckland.

Saviotti P. Metcalfe J. 1984: "A Theoretical Approach to the Construction of Technological Output Indicators." Research Policy. Vol. 13, pp. 141-151.

Sayer A. 1986a: "New Developments in Manufacturing: The Just in Time System." Capital and Class. Vol. 30, pp. 43-72.

Sayer A. 1986b: "Industrial Location on a World Scale: The Case of the Semi-Conductor Industry." in Scott A. Storper M. Production Work and Territory: The Geographic Anatomy of Industrial Capitalism. Allen and Unwin, Boston, pp. 107-123.

Sayer A. 1989: "Postfordism in Question?" International Journal of Urban and Regional Research. Vol. 13, No. 4, pp. 666-696.

Schoenberger E. 1988: "From Fordism to Flexible Accumulation: Technology, Competitive Strategies, and International Location." Environment and Planning D: Society and Space. Vol. 6, pp. 245-262.

Schoenberger. E. 1989: "Thinking About Flexibility: A Response to Gertler." Transactions of the Institute of British Geographers. Vol. 14, pp. 98-108.

Scott A. 1988a. Metropolis - From the Division of Labour to Urban Form. University of California, Berkeley.

Scott A. 1988b. New Industrial Spaces - Flexible Production Organisation and Regional Development in North America and Western Europe. Pion, London.

Scott A. Storper M. 1986: Production Work and Territory: The Geographic Anatomy of Industrial Capitalism. Allen and Unwin, Boston.

Sewell D. 1965: Electric Household Durables: Economic Aspects of their Manufacture in New Zealand. NZ Institute of Economic Research, Wellington.

Sheard P. 1983: " Auto-Production Systems in Japan: Organisations and Locational Features." Australian Geographic Studies. Vol. 21, pp. 49-68.

Shoebridge N. 1990: "Email Sets its Sights on Asian Markets." Business Review Weekly. October 12, pp. 34-36.

Sinclair K. 1980: A History of New Zealand. (3rd edition). Penguin, Hammondsworth.

Sinclair K. (ed). 1987: Tasman Relations: New Zealand and Australia, 1788-1988. Auckland University, Auckland.

Shingo S. 1986: Zero Quality Control: Source Inspection and the Poka-Yoke System. Productivity Press, Cambridge, Mass.

Soja E. 1989: Post-Modern Geographies: The Reassertion of Space in Critical Social Theory. Virgo, London.

Spoonley P. 1988: "Being British." in Jesson B. Ryan A. Spoonley P. The Revival of the Right: New Zealand Politics in the 1980s. Heinemann Reed, Auckland, pp. 86-115.

Storper M. Walker R. 1989: The Capitalist Imperative: Territory, Technology and Industrial Growth. Blackwell, Oxford.

Strasser S. 1982: Never Done: A History of American Housework. Patheon, New York.

Tait G. (ed). 1959. Manufacturing in New Zealand. Cranwell, Auckland.

Thompson E. 1967: "Work, Time-Discipline, and Industrial Capitalism." Past and Present. Vol. 38, pp. 56-97.

Thompson P. 1989: The Nature of Work: An Introduction to Debates on the Labour Process. Macmillan, London.

Toffler A. 1970: Future Shock. Pan, London.

Toffler A. 1980: The Third Wave. Pan, London.

Vowles J. 1987: " The Forth Labour Government: Transforming the Political Agenda." in Boston. J. Holland. M. (eds). The Forth Labour Government: Radical Politics in New Zealand. Oxford University, Auckland, pp. 15-35.

Walker R. 1988: "The Geographical Organisation of Production-Systems." Environment and Planning D. Vol. 6, pp. 377-408.

Walker R. 1989: "Machinery, Labour and Location." in Wood S. (ed). The Transformation of Work? Skill, Flexibility and the Labour Process. Unwin Hyman, London, pp. 59-90.

Walsh P. 1989: "A Family Fight? Industrial Relations Reform Under the Forth Labour Government." in Easton B. (ed). 1989. The Making of Rogernomics. Auckland University, Auckland, pp. 149-170.

Walsh P. 1991: "Bargaining Options Under the Employment Contracts Act." New Zealand Journal of Industrial Relations. Vol. 16, pp. 167-174.

Walton R. 1985: "From Control to Commitment in the Workplace." Harvard Business Review. Vol. 64, No. 2, pp. 76-84.

Wanna J. 1989: "Centralisation Without Corporatism: The Politics of New Zealand Business in the Recession." New Zealand Journal of Industrial Relations. Vol. 14, pp. 1-15.

Ward D. 1987: "Electronics the Key to Whiteware Company's Growth." Neweletronics, October, pp. 32-35.

Watson J. 1976: "Maurice Paykel Co-Founder of a Resounding Success." New Zealand Company Director. No. 103, pp. 8-10.

Webb S. Collette J. (eds). 1973: New Zealand Society: Contemporary Perspectives. John Wiley, Sydney.

Whitwell 1987: "Monetary Policy with a Deregulated Financial Sector." in Bollard A. Buckle R. (eds). Economic Liberalisation in New Zealand. Allen and Unwin, Wellington, pp. 261-282.

Williams A. Owen B. Emerson A. 1991: The Nissan Way: From Conflict to Commitment. Collins, Auckland.

Williams K. Cutler T. Williams J. Haslam C. 1987: "The End of Mass Production?" Economy and Society. Vol. 16, No. 3, pp. 405-439.

Wolf N. 1990: The Beauty Myth. Vintage, London.

Wood S. (ed) 1982: The Degradation of Work? Skill, Deskilling and the Labour Process. Hutchinson, London.

Wood S. (ed) 1989: The Transformation of Work? Skill, Flexibility and the Labour Process. Unwin Hyman, London.

Wood S. 1989: "The Transformation of Work?" in Wood. S. (ed). The Transformation of Work? Skill, Flexibility and the Labour Process. Unwin Hyman, London, pp. 1-43.

Wood S. Kelly J. 1982: "Taylorism, Responsible Autonomy and Management Strategy." in Wood S. (ed). The Degradation of Work? Skill, Deskilling and the Labour Process. Hutchinson, London, pp. 74-89.

Wooding P. 1987: "Liberalising the International Trade Regime." in Bollard A. Buckle R. (eds). Economic Liberalisation in New Zealand. Allen and Unwin, Wellington, pp. 86-101.

Woods N. 1974: "Industrial Relations Legislation in the Private Sector." in Howells. J. Woods N. Young F. (eds). Labour and Industrial Relations in New Zealand. Pitman Pacific. Carlton, pp. 81-106.

Yarwood V. 1987: "Fisher and Paykel: Fighting on the Home Front." Management. Vol. 34, No. 5, pp. 72-75.